

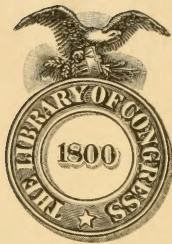
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COBURN'S MANUAL





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FOSTER DWIGHT COBURN

COBURN'S MANUAL

A COMPLETE GUIDE TO THE FARMERS' CYCLOPEDIA

BY
F. D. COBURN

SECRETARY OF THE KANSAS STATE BOARD OF AGRICULTURE 1882, AND 1894 TO 1914
and
THE EDITORIAL BOARD OF THE FARMERS' CYCLOPEDIA



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FOREWORD

In recent years, most of the agricultural wisdom gleaned since the beginning of things, and especially that part of it applicable to North America, has been scientifically and practically tested anew by Departments of Agriculture of the United States and Canada and by the Experiment Stations and Agricultural Colleges of the different States and Provinces, and published in bulletins and reports. These innumerable and valuable documents deal with every topic in which the farmer and his family have material interest. But there has been little or no attempt at systematic coördination or consistent classification. As a consequence only a fragmentary part of the truths they held until now could be found except by tiresome if not costly search, and often the search was futile.

To make it really accessible the publishers have brought this vast knowledge together into the most compact form possible, and at a price within reach of everyone. The result is the seven volumes constituting the *Farmers' Cyclopedia*, to which this manual is intended as a guide and ready reference.

Its purpose, therefore, is to tell the inquirer how and where he may at once and easily find in the nearly five thousand pages of the *Cyclopedia* the particular fact he needs.

A MESSAGE TO THE CITY MAN

It is being stated everywhere and by almost everybody that the farmer is the most prosperous of men. We hear of "Back to the Land Movements" and the man in the city is urged to drop his pen or tools, come out and till the soil, give up his indoor health-sapping life, and live in the clear, fresh air of the country.

Much of what is said on this score is true, and some is not true. I was for twenty-one years Secretary of the State Agricultural Department of Kansas, and now in my retirement, when I can look at things in a quiet, contemplative spirit, my message to the Man in the City who seeks liberty and health on the farm may be of value.

If beginning my life over again and working in a city for a salary, I believe I would give up my position and take up farming; but not with the expectation of having less work to do or of being able to live a life of ease during the years when my strength of body and mind was in its prime. On the contrary, I would expect to work hard, for long hours, and I would also expect that when I had finally earned a cessation from work I would be able to enjoy the fruits of my toil and that the worldly goods that I had accumulated would be sufficient to meet these demands.

I say this because I have seen it demonstrated; I have seen thousands of young, eager Americans come out on the land, full of vim, energy, and determination, and I see these same men now riding by in their automobiles and enjoying the latter half of their lives in the satisfaction of financial ease.

The opportunities for success in farming are not gone; they never will be gone. Farming is a rock-bottom industry, and so long as there is a human being, farming will hold its place as the most important of all industries.

Up to a comparatively few years ago, farming was an industry handed down from father to son; was hit or miss, but mostly miss. Those days are rapidly receding now, and the era of the educated farmer is close at hand. Education is coming out to the farm; our ways of living are changing; our very thoughts are changing; we are more progressive, more alert, we are seeing things in a new light. To-day, farms are run less by hand-power and more by brain-power; it is less a matter of wondering what one ought to do and more a matter of finding out from books what one must do. That is why farm life says to the City Man, to men who work in offices, shops, and factories, and have not even a flower-pot full of earth to call their own, "Come out to the land and share in this prosperity."

But, men that make the great change, do not come with delusions; do not come thinking it is easy, that you have nothing to do but plant a seed and then pick your ripened grain. You have lots of work to do, and will have long hours. But study and toil will bring you health and comfort. That is why I stand back of these books—this great *Farmers' Cyclopedia*, with the vast accumulation of facts, verified by centuries, all arranged here, indexed and easily accessible. Read these books systematically, a little now and then whenever you have time, and you will be more prepared for the great step. You will have a thorough grounding in the theoretical side of farming. You will know what the great men of farming have learned by great patience and at a great expense of time. These volumes cover every important phase of farming, from the planting and the growing to the home life and the home.

With perseverance, energy, and judgment, you will attain prosperity and the compensations of success in its best sense.

CHAPTER I

BIG PLANS FOR BIGGER PROFITS

In farming, as in every other field of human endeavor, those achieve success who characterize their work either by more originality or by greater skill than their fellows. The Indian who threw a dead fish into each hill when planting corn had discovered a new way to feed plants, and achieved success while his neighbor failed. The Wisconsin farmer who was awarded a \$300 prize and much recognition as the "best farmer in the State," practiced in most ways the same sort of agriculture as hundreds of others under practically similar circumstances, but he did it *better* than they, and hence he was successful.

The magic factors, therefore, are originality and more efficient methods, and with these constantly in mind the *Farmers' Cyclopedias* has been built. They form, moreover, the keynote of the present manual, by means of which the great mine of information and helpfulness may be most expeditiously opened.

THE SIMPLE SCIENCE OF PROFIT MAKING

When we analyze any branch of farming anywhere, we find that its profits result, as in any other productive industry, from keeping expenses below returns. Going still farther, we find that this desirable state of affairs is in turn dependent upon five factors with which every manufacturer is familiar and every farmer *should be*. These are:

(a) The accessibility and low cost of raw materials. In manufacturing these may be coal, or ores, wool, lumber, horsepower, etc. In farming they consist of elements such as plant food, moisture, and natural vegetation. A dairy farm located near a brewery might find brewers' grains an important economical food material, while in the northwest wild grasses would perhaps represent the cheapest raw materials.

(b) The accessibility of markets and remunerative prices for finished products. It is because of this factor that market gardeners locate near large cities, and that, on the other hand, they are able to farm such high priced land and yet prosper.

(c) The complete utilization of by-products and waste. It is in this field that manufacturing industries have made some of their most remarkable strides, and the same general principles are adaptable to farming. The feeding of skim milk to hogs and fowls, the careful conservation and application of manure, the plowing under of straw instead of burning it—all these are examples of utilizing "scrap," as the manufacturer would say. (In this connection read Vol. VII, p. 49, on *Utilizing Farm Wastage*.)

(d) The complete utilization of labor. With the insufficient supply of farm help, everywhere, it is becoming essential that farms be so managed as to provide work the year round, in order that perma-

nent positions can be offered and reliable, permanent, preferably married, help obtained. (At this point the discussion of *Wages on the Farm*, Vol. VII, p. 80, will be of interest.)

(e) Economical methods of production or the manufacture of products into more valuable materials. This practically repeats what we have already mentioned. Whether the final product is baled hay, fresh eggs, milk, meat, flowers, fruit or grain, there is a best, most efficient, most profitable manner of turning it out. But the particular method depends mostly upon the environment, the local conditions. So once more we come to face the vital importance of adaptation.

THE IMPORTANCE OF ADAPTATION

The subject of adaptation is so broad, so complex, and so tremendously important that it is made the keynote of this entire chapter. Aside from the small, extremely local considerations, such as whether the farm is on a southern or a northern slope, whether the soil is newly broken or long since subdued, and the like—all of which are problems for the individual—there are larger, sectional questions of adaptation such as determine the entire type of farming, the location in which the farm buyer looks for property, and other fundamentals. The East is naturally adapted to types of farming that may or may not succeed in the South, the Far West or on the Great Plains, and *vice versa*. A knowledge of these special adaptations and opportunities is sure to save the prospective farmer much time and investigation, and may easily mark the difference between success and failure, whether the farmer be new to the business or the location, or not.

THE UNITED STATES AND ITS OPPORTUNITIES

The present chapter, then, summarizes these larger adaptations of our seven great agricultural sections. We have opinions of nationally renowned authorities, each of whom tells of the leading opportunities in one of these sections. Quoting these, we then augment and supplement their usefulness by considering them in relation to the *Farmers' Cyclopaedia*, and listing all references in the seven volumes to the opportunities they emphasize.

It only remains for the farmer or student to decide which section of the country appeals to him, then to note the advice of the authority for that group of States, and finally to study the details of the particular phases of agriculture referred to wherever, in the four thousand-odd pages of the *Cyclopaedia*, they are found and dealt with.

§ I. NEW ENGLAND

Of this section, Mr. L. G. Dodge, Agriculturist of the U. S. Department of Agriculture, says: "New England is adapted to the perishable products like milk, fresh vegetables, and fruit, and to bulky ones like hay, cabbage, potatoes, both of which classes are difficult to bring from any great distance. Dairying will probably remain the backbone of New England live stock interests, but on a more profitable basis, in less quantity but with better cows. Sheep will often take the place of cows in remote, or northern areas, or where there is excess of

grazing. The fruit and truck crops will be grown only by a small part of the farmers as a specialty, and elsewhere as a minor cash crop item on the general farm, while most of the milk will be produced by farmers who have some good cash crop as well. This is a hay-consuming region, and there is never a surplus of hay as a whole as there is in some other regions. Also the coarser vegetables are consumed in great quantities in manufacturing centers, and such as cabbage and potatoes must continue to be valuable cash crops for the dairy or general farmer, along with hay wherever the local live stock interests do not absorb all of the latter. Lumbering or work connected with it makes an important source of winter revenue for the farmer in many parts of Northern New England."

This at once emphasizes the importance of dairying, various phases of which are discussed in Vols. I, III, and VII. First, of course, one will want to study the different types of dairy cow described in Vol. I, pp. 119-135, and their adaptations to the requirements of a well-managed Dairy Herd, Vol. I, pp. 138-148. The needs of cows as to feed, care at calving, and special sanitary provisions fill the remainder of Vol. I, Part II, and pages 198, 224, etc., of Part III. While perfect health of the herd is always to be hoped for, we must be prepared for injuries and various ailments. Nearly 475 pages of Vol. III, devoted to Diseases of Cattle, supply the necessary advice as to protection in the most convenient and practical manner. However, cattle form only half the dairy business, and there remain the care, treatment, utilization, and marketing of milk, butter, and cheese as discussed in the fifty-odd pages of Vol. I, Part II, under Milk. The disposition of skim milk is also touched on under Swine Feeding, Vol. I, p. 460. To cover thoroughly the subject of Dairy Barns it will be necessary to jump from Vol. I, p. 158, to Vol. VII, p. 122.

If, as Mr. Dodge suggests, you are in the rougher and more northerly sections, the regular marketing of dairy products may have to give way to the shipping of wool or mutton once or twice a year, and the dairy herd be replaced by sheep. Presumably you will choose a hardy, dual purpose breed, such as the Shropshire, Dorset or Cheviot (Vol. I, pp. 338, 341, 342). All the breeds are described between pages 335 and 343. The remainder of Part III of this volume is devoted to Sheep Management, and the New Englander will want to read especially the articles on Pasturage Systems (p. 373), Market Grades (p. 385), and the Details of Feeding (p. 344). The diseases and parasites that annoy sheepmen are allotted 119 pages in Vol. III, beginning on page 475.

Turning from live stock to the more important crops for New England, we find the first 200 pages of Vol. IV devoted to the many details in the raising and marketing of hay. The discussion of cabbage (Vol. IV, p. 266), while coming in the Vegetable Garden section, considers the crop also from a market or truck garden standpoint. The potato, which is such an important factor in Maine farming, is also dealt with in this volume on pages 320 to 343. An interesting note on the special fertilizer needs of this crop is found in Vol. VII, p. 491, while the insects and diseases that attack it are described, and

the means for combating them given, in Vol. VI, p. 164, Vol. VII, pp. 591 and 681, and Vol. VI, pp. 557-566 and 618, respectively.

If near a summer resort the New Englander will find an excellent market for all the other vegetables, for which cultural methods are given in Vol. IV, pp. 217 to 368, inclusive. He may also try fruit on a small scale, adapting the directions included in the first 250 pages of Vol. V to his particular conditions. In both cases, pages 184-200 of Vol. VII, on Intensive Farming, will interest him. As an illustration of a special and highly profitable crop under certain conditions such as those found throughout the Connecticut Valley, there is tobacco, which is discussed as a Special Farm Crop in Vol. V, pp. 587-619.

Finally there is the oft neglected woodlot—frequently one of those by-products spoken of already, but which in competent hands can return profit by keeping men busy in odd times when other work stands still. Section II of Vol. V treats Farm Forestry in all its phases, but every farmer with any sort of a stand of lumber trees should read pages 319 to 370 at least.

§ II. THE NORTH ATLANTIC STATES

Moving into the group of States including New York, Pennsylvania, New Jersey, Delaware, Maryland, and Virginia, we would expect to find conditions not so very different from those in New England. And, indeed, Prof. G. F. Warren, of the Department of Farm Management of Cornell University, says: "It is somewhat difficult to state the types of farming adapted to the North Atlantic States because the conditions of soil, climate, transportation, and markets are so variable. The first use of land in this region is naturally to furnish truck crops, potatoes, cabbages, moderate price fruits, hay, high-class eggs, and milk for the vast number of city inhabitants in it. These products are either too bulky or too perishable to be shipped long distances, so that the North Atlantic States have a practical monopoly on them. However, there is more land in the North Atlantic States than is required for their production, hence only the land most favorably situated is usually devoted to them. The rest is naturally used for other products such as the production of dairy cattle, butter making, cheese making, production of wheat, field beans, etc. Since the city population is constantly increasing, there is therefore a constant demand for first-class products, and, as the census figures show, there is rapid decrease in such products as wheat, butter, and cheese that can be shipped long distances.

"A third class of products may be called by-products or incidental products. There is considerable skim milk available for use in feeding chickens and hogs. There are always waste products on the farm that could be utilized to produce a small number of hogs, so that in the North Atlantic States a considerable number of hogs are raised but their production is largely based on these by-products. A few sheep also can be kept on small farms at a very small cost because to a considerable extent they live on weeds and low-grade products. The number of sheep in the North Atlantic States is constantly decreasing,

but there are a considerable number of farms on which it still pays to keep them primarily as scavengers.

"A fourth class of products are those produced primarily for home use regardless of whether or not they would pay to raise to sell. There are many farmers that raise one or two hogs for home use that probably could not raise hogs to sell at a profit.

"A fifth class of products might be mentioned which are only rarely raised at profit. Of those beef and pork when grown on grain are typical. The grain and hay required for wintering beef cattle cost so much here compared with the Middle West that, in spite of the cheap pasture, the year's food supply is too expensive. In the North Atlantic States nearly all pasture land is used for dairying or for the production of dairy cattle."

Here we encounter many of the specialties already touched upon under New England, with the addition of a few such as limited hog production, poultry raising, and the culture of wheat, field beans, etc. However, these added subjects can be thoroughly studied in the *Cyclopedia* by turning to Vol. I, p. 417, and Vol. II, p. 410, for Swine; Vol. I, pp. 518-626, and Vol. II, pp. 554-609, for Poultry; Vol. IV, pp. 376-379 and 442-463, for Wheat; Vol. IV, p. 257, for Beans; and Vol. IV, p. 634, for Hops, which is also an important crop in New York.

§ III. THE COTTON BELT

One of the most remarkable agricultural developments of the past decade has been the advance of the South in better balanced, more profitable farming. This has been due to various causes, chief among them being the indefatigable work of the late Seaman A. Knapp, of the National Department of Agriculture, and his staff of demonstration agents, and the efficient campaigns against the Cotton Boll Weevil and the Texas Fever Tick of cattle. In a way the South has been always at a disadvantage; being the only section of the country adapted to the growing of cotton, rice, and sugar cane, it found the temptation to grow only those crops almost irresistible. However, of late, tremendous opportunities have opened along the lines of diversified farming, especially such farming as includes live stock in its calculations. Clarence H. Poe, of North Carolina, editor of the *Progressive Farmer*, and one of the leaders in Southern agricultural progress and coöperation, says: "The great agricultural need of the Cotton Belt is to make use of its opportunities for growing live stock, food products, and feed stuffs, while at the same time keeping its primacy in cotton production. With wise methods of rotation, manuring, and proper emphasis on cover-crops, our longer-growing season would enable us on our present cultivated acreage to grow as much cotton as we now grow and all our corn and meat besides."

This is a welcome message of moderation, when so many opinions have seemed to urge an almost total substitution of green manure crops, grains, etc., for the invaluable cotton.

For the Southern farmer who keeps Mr. Poe's advice in mind the *Cyclopedia* offers generous assistance. The culture of cotton according to modern methods is treated in some forty pages of Vol. V, be-

ginning on page 529. Sorghum (often erroneously spoken of as "cane"), that Southern cousin of Indian corn, is discussed in Vol. V, p. 647, and the real (sugar) cane on page 657 of the same volume. Rice, though rather local, should be studied on the pages following p. 600, Vol. IV, which is followed by a discussion of the various uses of the Peanut on page 610.

Crop Rotation upon which much of the new agriculture of the South is based is found in Part II of Vol. VII, on p. 201; while many of the forage plants that can be worked into a rotation are described on the pages that follow p. 132 of Vol. IV; the cowpea, one of the most important of these, receives special mention on page 526 and others following.

The articles on dairy activities and hog-raising possibilities, which are proving so attractive south of Mason and Dixon's line, have already been referred to, but it remains to call attention to the discussions concerning Beef Cattle and the Production of Beef in Vol. I, pp. 263-334, and concerning mules and horses, with particular reference to Southern conditions on pages 68-88.

In the Gulf Coast section of Texas the vegetable industry has long been prominent, so the extensive discussion of Vegetable Growing, beginning on p. 217 of Vol. IV, will again prove of value. The citrus fruit area is limited but of great importance, and pages 263-300 supply valuable advice regarding these crops and others of even a more tropical nature, such as olives, dates, figs, etc. Another important item in Southern horticulture is the pecan, Vol. V, p. 309.

§ IV. THE EAST CENTRAL STATES

This group, containing Wisconsin, Michigan, Illinois, Indiana, Ohio, West Virginia, and Kentucky, can be generically referred to as approximately the "Corn Belt," and we immediately schedule corn among the more dependable standbys and opportunities for the farmers of that section. Such farmers will find the latest ideas regarding Corn Culture in Vol. IV, pp. 400-442, and other references as follows: Corn Diseases, Vol. VI, p. 579; Corn Insects, Vol. VI, p. 168; Corn Fertilizers, Vol. VII, p. 489; Corn Machinery, Vol. VII, p. 85; Corn Production, Vol. VII, p. 169; Corn as a Soiling Crop, Vol. I, p. 157; and How to Can Corn, Vol. VII, p. 597.

Yet corn is far from being everything even in the Corn Belt. Says Joseph E. Wing, of Ohio, farmer, lecturer, and writer:

"The most profitable type of farming for the Corn Belt is undoubtedly a mixed type, with corn, clover, wheat, pigs, and either beef cattle or dairy cattle in addition. That system gets the maximum output with the least labor outlay, especially when beef cattle are fed and sows kept on clover or alfalfa pasture. There is proof near me at 'Houstonia,' the 10,000-acre tract of corn belt land. There, they have tested nearly all sorts of farming, including fine dairies and farms devoted to pure-bred stock. They make nearly all the farms pay, but the old-fashioned *general* farms, leaning hard on corn, clover, and swine, have paid largest. On farms of such type the large output of pork is the big factor in profits."

By this token clover must be regarded as no less important than corn, and its qualities and requirements must be looked up in Vol. IV, pp. 59-82. So, too, its enemies (Vol. VI, p. 577, and p. 197). Red Clover as a Soiling Crop is discussed in Vol. I, p. 156, while Crimson Clover as Green Manure is treated in Vol. VII, p. 504. Other sorts valuable as forage are referred to in Vol. IV, pp. 146-147, 149, 153, 156, and 161.

The culture of wheat is fully outlined in Vol. IV, pp. 376-379 and 442-463, and its value as a food for live stock is worth referring to, in Vol. I, p. 319.

When it comes to the hogs themselves, the care of which is treated in Vol. I, p. 424, and Vol. II, p. 414, it is interesting to note the danger of Feeding Diseased Corn, Vol. II, p. 511, and the matter of Proprietary Stock Foods for Swine, Vol. I, p. 495.

Similarly the corn belt farmer should become thoroughly informed as to Cattle Feeding (Vol. I, pp. 153-158, 166, 169, 173, 182, 288-330), and Cattle Fattening (Vol. I, pp. 283-284, 301), as well as the related principles of Feeding Dairy Cows, also in the same volume, pages 161-181. With the prices of feed stuffs and good farm land where they are at present it is important to figure the cost of every pound of gain and every ounce of butter fat to the last cent, else the apparently profitable farm may prove sadly unprofitable.

The subjects thus far mentioned relate, of course, primarily to the great central, cleared, and level-to-gently-rolling section of the corn belt. In some States included in this group, different conditions obtain and other specialized opportunities are waiting. Kentucky, Wisconsin, and Ohio, for instance, are all important factors in the nation's production of Tobacco (Vol. IV, p. 177; Vol. V, pp. 587-615, 619-620; Vol. VII, p. 170), while Hemp (Vol. V, p. 575, and Vol. VII, p. 95) is grown in northern and central Kentucky, though not so extensively as heretofore.

Wisconsin is largely a dairy State, with something of a leaning toward the Guernsey breed (Vol. I, p. 122), but its Cranberries, too, (Vol. V, p. 253) are a source of some income. Farther north there still remain large areas of timber land offering generous returns under intelligent treatment according to the tenets of Scientific Forestry (Vol. V, pp. 319-468), while other wild tracts require only Stump Removal (Vol. VII, p. 23) or Drainage (Vol. VII, pp. 105, 123, 258-276, 285, and 303) to show their worth for agriculture.

Farther east in Michigan, and in West Virginia as well, fruit-growing is a highly important though localized industry. Peaches (Vol. V, pp. 96-98, 215-223) and Apples (Vol. V, pp. 79-80, 170-205) are especially successful in these States, where, in addition to favorable climatic conditions, conveniently accessible markets render these phases of horticulture distinctly attractive.

§ V. THE MIDDLE WESTERN STATES

By common consent the States so designated are Kansas, the Dakotas, Minnesota, Nebraska, Iowa, and Missouri, which occupy a rectangular block, fourteen degrees from East to West and twelve

degrees from North to South, of the most fertile soil of the Western Hemisphere. This wonderful Middle West is the bread-and-meat-basket of much of the world; here are produced the substantial upon which armies, navies, and nations are fed. Great as its productions are, the possibilities are not yet approached or even comprehended; these can only (and will) be realized by conserving and promoting the natural fertility through a sane system of rotations, a larger recognition of the legumes, more animal husbandry, including dairying, in proportion to grain raising, and increased consumption of its grain and forage on the farms where grown, with more thorough tillage, which means putting the same labor on much smaller areas, resulting in largely increased acre yields. Mankind *can* do without most of the so-called "necessaries," but not without a commissary. The Middle West is it!

It is not difficult for a native farmer of this agricultural empire to grow enthusiastic. One of his weaknesses is failure to realize that soils can become impoverished, and that unless the supply of plant food is maintained, corn and wheat and oats will not continue to yield abundantly year in and year out. At this point therefore let him pick up Vol. VII of the *Cyclopedia* and study Fertilization and Fertilizers as discussed on pages 388-531. Then perhaps he will review the subject of Field Crops, Part III of Vol. IV, with a view to working out a rotation no less profitable and far more valuable than his old-time methods. He will want to review the chapters on Beef and Beef Cattle, and on Pork Production, and survey the, perhaps, more unfamiliar field of the Dairy Cow. In taking up a more extensive use of cover-crops and green manures he will find it necessary to plow more deeply; in fact, he will find it to his advantage to run through the whole philosophy of plowing as outlined in Vol. VII, pp. 42-49. Finally a natural result of the change to more diversified methods will be more orchards and more complete home gardens, about which he will find full information in Vols. IV and V.

§ VI. THE MOUNTAIN STATES

The sixth section is easily the largest of all, including the vast valley and plain expanses of Montana, Idaho, Wyoming, Colorado, Utah, Nevada, Arizona, and New Mexico. For many years it was the least developed, agriculturally, of all our tillable territory. Men dreaded to pass the 100th meridian, which, roughly speaking, marks the dividing line between humid and arid North America, and when there were no more free homesteads left east of the "Great American Desert," they scurried across to the Pacific Coast with scarce a glance at the soil beneath their feet.

But gradually there came new knowledge of new, undreamed-of opportunities. The soil, it was found, was not all alkali, but largely rich, enduring volcanic ash; wild grasses had become acclimated and other more valuable crops that would also thrive under the difficult conditions were sought, found, and introduced. And then came the crowning developments, irrigation and dry farming. To-day these two doors stand open and as the Great Plains farmer steps through he finds prosperity and happiness just beyond.

DRY FARMING AND ITS OPPORTUNITIES

Because these two routes to success are so different and adapted to such different conditions, we quote two well-known authorities in respect to their opportunities. Of the present status of dry farming, Mr. H. W. Campbell, a close student of such matters, says: "Up to 1900 farming in the semi-arid sections without irrigation rarely met with success, except in seasons of more timely and exceptional rainfall, and was usually a chance game.

"At this time the principle of storing and conserving the rainfall in the soil and its more general utility through certain specific physical conditions of the soil took definite form. On the Pomeroy farm at Hill City, Kansas, in 1901, under this plan 893 bushels of winter wheat were grown on 21 acres ($42\frac{1}{2}$ bushels per acre) when drouth caused the total failure of many fields. Wheat-growing spread, but lack of knowledge by the masses of the correct methods and principles caused many failures or short crops, and with no cows, hogs, or chickens to fall back on, the settler soon found himself in serious poverty.

"Further experiments in the production of fodder and grain for cattle and hogs and in methods of feeding have made possible more of general stock-farming. It is now established that crops of feed for cattle and hogs can be grown with less annual rainfall than is required for wheat. The degree to which moisture can be stored and conserved by tillage has but recently been understood.

"On the eastern slope, where the precipitation is mainly during the growing season, double disking as early in the spring as conditions will permit will loosen the surface so as to prevent the loss of moisture by evaporation and cause a more rapid and complete percolation of subsequent rains. Weeds must be destroyed when very small and the surface kept loose but not fine, up to planting time. Late planting of fodders has recently been found the best. A large number of fields of sorghum planted in Western Nebraska in 1914 as late as July 15th gave bigger yields than from early June planting. One field planted July 27th produced over five tons of very nice, dry fodder, while an adjoining field planted June 5th made but little over half a ton of poorer quality.

"Summer tilling consists in carrying out three distinct principles:

"First.—In storing and conserving the rain waters there should always be about two and one-half inches of loose soil mulch of a rather coarse nature; never fine or dust-like. No weeds can be allowed to grow. Ample moisture stored below is the only safeguard against hot, dry weather.

"Second.—The fine, firm seed and root bed is vital to both the carrying of a high per cent. of available soil moisture and the rapid, healthy growth of roots. Remember that without a highly sanitary physical condition of the soil a healthy, prolific growth of roots is impossible, without which there cannot be healthy, vigorous, fruitful plants.

"Third.—Thin seeding where a small quantity of water must be depended upon is very vital. Too much seed has caused many to

be disappointed in their crop in the semi-arid sections. The more perfect the seed bed the less seed needed because of the increased stooling or tillering of the plants. I have seen 44 bushels of wheat per acre from 15 pounds of seed.

"With clear understanding and an application of summer tilling methods each alternate season, good crops of winter rye and wheat can be grown. Rye put in early in September on summer tilled land affords much good pasture in the fall and early spring, and frequently a fair crop of hay or grain will follow. Prolific crops of vegetables, small fruits, and alfalfa can be grown with light rainfall by putting rows about three feet apart and giving frequent cultivation."

Following the lead of these suggestions, the reader of the *Cyclopedia* will find of special interest such articles as those on Dry Farming, Vol. VII, pp. 222-246; Alkali Soils, Vol. VII, pp. 343 and 373, and Vol. V, p. 121; Fodder Plants, Vol. IV, pp. 132-162; Seed Bed, Vol. VII, p. 21; Tillering of Grains, Vol. IV, p. 380, as well as the discussions of range methods of rearing sheep and cattle, which, though becoming of less importance as the farm raising of meat animals increases, have not yet died out by a good deal.

THE IMMENSE FIELD OF IRRIGATION

On the subject of irrigation, the vastness of which is typified by the wonderful achievements of the U. S. Reclamation Service, we quote Mr. C. J. Blanchard, Statistician of that bureau:

"The reclaimed areas in the Inter-mountain States of Montana, Idaho, Colorado, Wyoming, Utah, Nevada, Arizona, and New Mexico, together with portions of eastern Washington and Oregon, present inviting opportunities for practical and scientific farmers.

"This region possesses every gradation of climate from the north temperate to the semi-tropic and crops of almost every kind may be grown. The possibilities of agriculture apparently are unlimited where water can be supplied. In a region so varied in its physiography, climate, and soils, it is rather difficult to define with exactitude the particular kind of farming which offers the greatest opportunities, both as regards present returns and permanent betterment of agricultural conditions. My own thought is that desert agriculture ultimately must be intensive and diversified. However, until the pioneer stage is more largely passed and the abundant natural resources of this region are developed, farming in general must follow certain narrow lines and be governed by conditions more or less local.

"A careful study of crop statistics will show conclusively that irrigated farming pays. The average returns per acre from irrigated lands all over the West exceed those of the humid States. The cropped areas of the Government farms, largely tilled by men of small means and of limited experience, show an average of \$25 per acre as against \$16.30 per acre for the United States. It is only too evident, even to a casual observer, that the reclaimed lands are still far from a condition of proper tillage or intelligent cropping. The present average yield cannot be assumed, therefore, as a limit of future possibili-

ties. In fact, the contrary is proven on almost every farm where skill and practice have been shown.

"At the present time, irrigated agriculture revolves, to a great extent, around one crop—alfalfa. This legume is the soil builder and the mortgage lifter of the rainless country. It brings to the soil the element of humus which is lacking in the arid region. It supplies the most valuable forage that can be grown and it prepares the land for the growing of every kind of crop for which this region is adapted. It may be said that this crop, for many years to come, will be a determining factor in the kind of farming which the irrigated region will follow.

"The man of average capital and experience who seeks a location in the West should be governed by these conditions. He will first put his land in alfalfa. He will purchase enough stock to feed all he grows. He will thus enrich his soil and bring it into proper tilth. His later efforts toward specialization and intensification will depend largely upon local conditions and requirements and upon his own desires.

"I am convinced that the chance of failure for the man who takes up an irrigated farm and follows the above method is less than in any other section of the country. A small dairy intelligently handled, with pigs and chickens as side lines, is about as sure an enterprise in the West as I have yet seen. I believe, too, that our Government projects offer the best opportunities for men of moderate means to undertake.

"Under our new law, the settler has the benefit of the entire investment the Government has made in watering the land on a basis of 5 per cent. a year. His land costs him nothing. After he has paid the 5 per cent. for twenty years, he gets a receipt in full for all construction charge, at the same time becoming a part owner in the irrigation system.

"As the country develops and the lands are in alfalfa a few years, the opportunity for the specialist will come. It has come in a few places already. Great returns from crops grown for seed are assured. Notable among these crops are grains and grasses, potatoes, onions, peas, beans, tomatoes, and other vegetables. Colorado's western slope is producing 500 bushels of potatoes per acre and nearly all true to type. Idaho's peas are the seed crop for New England growers. Alfalfa and clover seed from irrigated farms top the market. Such crops are always big money crops and never feel the depression of overstocked markets.

"The irrigated West, therefore, invites the general farmer as well as the crop specialist and offers both an equal and splendid field for their activities."

The keynote, says Mr. Blanchard, is alfalfa. Look there, for the following discussions, and familiarize yourself with this most wonderful of crops: As a Soiling Crop, Vol. I, p. 156; As a Stock Food, Vol. I, p. 327; Alfalfa Feeding, Vol. I, p. 166; Alfalfa Hay, Vol. IV, p. 192; As Forage, Vol. IV, p. 80; Culture of Alfalfa, Vol. IV, pp. 32-59; Diseases, Vol. VI, p. 576, and Insect Enemies, Vol. VI, p. 205; and Nodules, the heart of the crop's secret powers, Vol. IV, p. 123.

Irrigation covers many pages; for example, Vol. VII, pp. 276-305; Vol. V, pp. 115, 120, 330; Vol. IV, p. 233, etc. So, too, the Principles of Drainage, that essential adjunct of irrigation, should be studied in Vol. V, p. 120; Vol. VII, pp. 105, 123, 258-276, 285, 303, and elsewhere. Similarly, Intensive Farming in all its phases as discussed in Vol. VII, pp. 184-201, should be reviewed, and its principles applied to any of the vegetable or fruit-growing activities mentioned elsewhere but of decided importance here. Among the special crops that have brought remarkable success to irrigation farmers is the Sugar Beet, which is carefully discussed in Vol. V, pp. 620-646.

§ VII. THE PACIFIC STATES

With so much emphasis being placed on the need of diversification over most of the country it is interesting to hear a different note sounded in the extreme West. Prof. E. J. Wickson, of the University of California, a man who has long held the affection and esteem of agriculturists and horticulturists everywhere, writes thus:

“Twenty years ago there was a sharp analogy between California and the South [in the prevalence of a one-crop farming system]; to-day there is none for we have escaped so far from our old, one-crop (wheat) that we are buying in Oregon and Washington and not producing enough for our own use. Therefore I am now exhorting Californians to grow more wheat, while two or three decades ago I was pleading with them to grow less. We are in fact widely diversified; and we are also advancing on a basis of live stock, rotation, and green manures. This policy is exactly right for California, for she has demonstrated it by experience. I do not speak for Oregon and Washington, but believe they are on the same line but not so far along.”

One can therefore, apparently, run the gamut of farm crops in thinking of the Pacific Coast, with an excellent chance that somewhere in that wonderful stretch of country any one of them will pay, and pay well. He might turn first to Vol. IV and pursue the subject of all the grain crops, the more specialized crops like Rice and Hops, and the still more specialized Prickly Pear, Castor Bean, or Mushroom; thence to Vol. V and the articles on Flax, Tobacco, Hemp, Cotton, and the Corn family; also to the many-sided fruit industry from Olives to Strawberries; or to Commercial Forestry, which, in the mighty mountains of the Coast Range, makes a strong appeal to strong men. Following the harvesting of the lumber crop comes the clearing of the cut-over land (Vol. VII, p. 22), wherein, as in the later cultivation of extensive areas, the traction engine is a powerful agent (Vol. VII, p. 25). And finally, in a section where climate, rainfall, soil, and all natural factors seem to conspire to assist the growth of plants, it will be most natural for the farmer, whatever his specialty, to give attention to the esthetic features of his home, to study the making and care of a lawn (Vol. VII, p. 67), the raising of flowers and shrubs (Vol. V, p. 469), and the attractive, efficient planning and building of the farmstead and the home (Vol. VII, p. 100).

CHAPTER II

GOOD NEWS FOR THE FARMER'S WIFE

Not so very long ago it was almost universally true that the hardest worked and least rewarded creature on the farm was the farmer's wife. Even to-day, in all too many cases her lot is unwarrantably hard, her responsibilities and tasks are excessive and her opportunities for rest and recreation altogether too infrequent.

But a new note has been struck; a new message is already going out to the women on the farms, a message of hope and opportunity, of new conditions and a new life. And it is this message, too, that the *Farmers' Cyclopedia* is helping to carry far and wide.

The sounding of this note has been indicated in two ways; there have become apparent two symptoms of an improvement in the atmosphere and sentiment that envelop the farm home. First, there has been an awakening of the farm woman herself, a realization of her desires, her needs, and her rights, and the courage and readiness to express her thoughts. Many of the letters published in the farm journals furnish an index to the progress in this direction. Whether they express firm, well-defined convictions, simple but heartfelt requests or blind, unanalyzed yearnings, in any case they tell of minds no longer dormant, of lips no longer sealed.

WHAT THE FARM WOMAN WANTS

And the keynote of their cry is—what? Can it be crystallized into one desire? Perhaps, and perhaps not. At any rate close to the central idea, to the concentrated longing of the farm woman, are these thoughts: "More appreciation and more of the conveniences that modern science is putting within reach of all." Thus the following letters from the columns of a practical farm paper seem strikingly characteristic:

WHAT THE FARM WOMAN NEEDS

"What the farm woman needs, if anything, is appreciation. Her husband and children and neighbors have taken her as a matter of fact, and often do not consider her wonderful influence for good, or her usefulness, until it is too late. When she lies down and dies her husband realizes what she was to him. He sees the many things then undone that were scarcely noticeable under her administration, she did them so kindly, so gently, and so modestly.

"What the farm woman needs is to be appreciated, to be loved and honored for her virtues. She is the mainstay of our civilization, the counselor and moral support of her husband, and the whole dependence of her children."

"Let the wife be a partner in the profits of the farm as well as a sharer of the work and hardships. Let her have her own share to spend as she pleases, to buy any conveniences that appeal to her, as well as the pretty articles of dress and furniture that every woman loves. She should have her share and feel that she has a right to it and not be compelled to beg for money and probably be refused. If the farmer gives her a pig or calf let it be hers when it becomes a fine hog or steer worth a price. And for pity's sake, let her have her produce money! She is the one who earns it. They are *her* chickens when they have to be cared for; but when they go to market they are usually called 'ours' or 'mine' by the farmer."

"The needs of the women in our part of Oklahoma exist in every form from a simple device for a sanitary salt shaker to the power to express our desires for the welfare of our children by a right to vote.

"Speaking from a tenant's point of view, we need more conveniences to help in our daily labor. We need houses that will protect us from the cold in winter and the dashing rains in spring, and that will be cooler and more sanitary in summer. Few of us have them.

"Another of our great needs is water, purer and more plentiful. The average tenant housewife of our section of Oklahoma has to economize with this life-sustaining element, hauled, perhaps, from a not altogether desirable source in a barrel.

"After we have acquired the water, shelter, a screened-in porch or a screen door we ought to have a better road to our market, a rest-room in town where after a long, tiresome ride we may make ourselves more presentable before we go out to do our shopping.

"We need a better social environment, such as would be provided by Sunday-school, church, and literary society, of which we have little in the country.

"And last, but not least, we need the lawful right to express ourselves by ballot. When given this we shall be able to turn the wheel of progress at least to the point where we may demand that we be looked upon not as mere pieces of machinery, which should move smoothly whether properly fitted into their surroundings or not. Give us intellectual interests, a little muscular assistance, and due compensation, and see what grandeur Oklahoma will display; see womanhood ennobled in the eyes of the next generation."

THE FARM BETTERMENT MOVEMENT

The second sign of changed conditions is an actual, general movement for farm betterment; for many of the identical improvements, in fact, for which farm women are asking. Whether it has come in response to their pleadings, or as a simultaneous, independent element in a universal advance of agricultural philosophy, does not matter. The important fact is that many agencies, individual and collective, are working for a new and happier life for the farmer's wife.

Turning, then, to the *Farmers' Cyclopaedia*, and in particular to Vol. VII, what suggestions and help can it bring into the woman's realm?

For the woman whose home is yet in the making, or in process of remaking, there are the discussions of the Farmhouse and Its Planning on pages 100 to 117. There she will find suggestions of improvements that may or may not have occurred to her, regarding the arrangement of her especial domain—the kitchen, and of the bathroom, bedrooms, etc. The advantages and simple requirements of a porch, either for sleeping or summer living purposes, are discussed on page 108; and the related matter of screens on page 110. Many a housewife has undoubtedly deplored the bother and inconvenience of swarms of flies and mosquitoes without knowing or recalling that the insects are also active agents in the spreading of such deadly diseases as typhoid, yellow fever, and malaria.

CONVENIENCES FOR THE FARM HOME

The lighting of the farm home may not fall entirely within the woman's province, although if she has a dozen or more lamps and lanterns to care for it certainly does. Nevertheless, in her modern rôle of "partner in the business" she should have a chance to express her opinions. The discussion of Lighting on page 112 will help equip her for this, as the article on Heating, on the same page, will give her arguments to advance in favor of more convenient systems than open fires or half a dozen coal stoves.

Of even more vital importance are Water Supply, Sewage, and Garbage Disposal Systems, on page 113 and following, in which connection the discussion of the Sanitary Privy (page 131) is also valuable. Throughout the country, but most of all in the South, where the hook worm plague is a direct result of unsanitary conditions, the modern inventions for disposing of the refuse on isolated rural properties have accomplished, and are yet to accomplish, infinite benefits. At the same time it is always well to be equipped for emergencies, and the article on Disinfecting and Disinfectants for the Home (page 658) contains invaluable suggestions for use in time of both sickness and health. Speaking of health, every woman on or off the farm should know something of the Dangerous Drugs (page 651) that are so widely advertised and circulated among unsuspecting purchasers who never know that the nostrums that seem to bring quick relief are but temporary deadeners of pain and, frequently, the cause of far greater, insidious, permanent harm. Such are many of the so-called Soothing Syrups (page 650), which often make a powerful appeal to overworked farm mothers, but which are no less than poison to the infants to whom they are administered.

HOW TO FEED THE FARM FAMILY

Better than the curing of existing ills is their prevention by means of wise living, in which no factor is more important than food. For a scientific yet practical knowledge of food materials, what they

are for, and how to prepare and use them, the housewife should read carefully the section on Home Economics, from page 534 to page 648. Here she will find articles on the Composition of Foods and Their Relative Cost and Value, on Cereals, Breakfast Foods, Bread Making, the Canning of Fruits and Vegetables, Jelly Making, the Use of Nuts and Oils, Keeping Foods, Food Adulteration and Simple Tests for Purity, Preservatives and Coloring Materials in Food, Scientific Human Feedings, and Errors in Food Economy. Then before she forgets it she should turn back to page 131 and read the latest theories in regard to the Ice Chest.

All this deals with the inside of the house, but a conspicuous feature of the new life for farm women is the theory that they shall spend part of their time out of doors—not in hanging out clothes, sweeping the porch, and the like, but enjoying some sort of change and recreation. This may be in caring for a flower garden, playing with the children, or merely taking a walk over the fields or through the woods; but it must be spontaneous and not enforced. And lest someone ask how this can be possible on a farm, let us ask first why, if the farmer's wife has to walk half a mile or so in preparing every meal—due to an inconvenient and unsystematic layout of the kitchen—and why, if a new, well-planned arrangement can reduce these necessary steps to one-eighth or one-tenth, should she not have the right to walk the rest of that half mile out of doors if she desires? This is not so far-fetched. Says Isabel C. Barrows in a recent publication of the New York State College of Agriculture:

WHICH LIFE FOR YOUR WIFE?

“Two pictures are in my mind. One is a great Canadian kitchen. . . . The floor space of the kitchen took an hour or two to scrub; every time a meal was prepared the tired farmer's wife had to walk about a mile between cupboard and table, sinkroom, or springhouse, and stove. This is no exaggeration; it was actual measurement. She would have thought it impossible to spend as much time in walking through the beautiful maple grove.

“The products of the kitchen, so far as cooking was concerned, were fried pork, . . . griddle cakes fried in lard, doughnuts fried in deep fat, hot coffee, boiled potatoes, turnips, cabbage, roast or boiled pork, beef, lamb or chicken, pie, green tea, cookies, cakes, beans, hot biscuits. . . . That meant hours of cooking, miles of walking, a big pile of wood to burn, and several pails of water from the spring, some rods away. There were half a dozen in the family, all dyspeptics, and the poor wife was always tired.

“The other picture is of an old-fashioned farmhouse, which had a large storeroom opening off from the kitchen. Shelves were on two sides, a door on one, and a window on the fourth. An up-to-date man took the old farm. A spring up on the hill was piped and the water brought into this storeroom. A good blue-flame kerosene stove was placed beside it on a zinc-covered table. A small portable oven was hung above it, which could be lowered over the stove when it was needed for baking. Supplies of all kinds for cooking were placed

on the shelves, with cooking and serving dishes. The housewife could stand in one spot in that little room and do every bit of her cooking without taking one step. A stool, which when not in use was slipped under the table, was used for all work that she could do sitting down.

"The food included no meat, but it was amply nutritious. . . . Cooking in this household was made easy, the food was excellent, and the digestion perfect. Instead of walking in the kitchen the good wife walked in the woods, and the breath of wild flowers saluted her nostrils instead of the odor of grease."

THE WOMAN'S REALM OUTDOORS

Thus we should touch upon the important subjects of Economy in Home Management (Vol. VII, p. 666) and the still broader field of Home Relations (Vol. VII, p. 670). But to return to outdoor considerations and the *Farmers' Cyclopedia*: The farm woman of the new régime will want first of all To Prevent the Desolate Home (Vol. VII, p. 77) and one solution of the problem will be the application of principles of Landscape Architecture and Garden Planning. Let her, therefore, take up Vol. V and begin on page 469 the study of Landscape Gardening for the Country Home, Shrubs (page 473), Vines (page 474), Flowers and Flower Gardens (pages 479 to 482). In Vol VII also the articles on Lawns (page 67) and Trees and Shrubbery (page 73) are interesting and practical. The source of all such materials is an interesting point and is touched upon in Vol. V, p. 482, under Nurserymen.

It should not rest entirely with the garden to supply blossoms, not, at least, while Window Gardens (Vol. V, p. 486) may be had. A list of Plants for this purpose will be found on page 488, and a discussion of Plants for Indoor Decoration in General, on page 485.

There is another side to flower-growing activities which offers enticing opportunities to farm women who are able to take advantage of them. This is Commercial Flower Gardening (Vol. V, p. 490), whether with the Raising of Cut Flowers (page 492) in mind, or Bulb Growing (page 493), or the Raising and Selling of Flowers as a Crop (page 499). And then there is in addition the possibility of raising Oil-Bearing Plants, and of Home Perfumery-Making (page 494).

Possibly these suggestions seem to be loading unfair responsibilities on the already overburdened shoulders of the farmer's wife. This is not, however, the intention, and lest that result attend, the additional suggestion is made that wherever possible the housewife play the part of superintendent or foreman indoors, just as the farmer is foreman out on the farm. Thus let her direct the house-keeping and attend to the more important or delicate matters herself, but turn the wearisome chores over to hired help, who shall be paid—and here is the crux of the plan—out of the profits of the side issues from which the farm woman may obtain pleasure as well as financial returns.

In addition to the raising of flowers in the garden and in the greenhouse, there may be suggested as possible sources of such profits,

Poultry (Vol. I, pp. 518-626), Bees and Bee Keeping (Vol. I, p. 648, and Vol. VI, p. 401), Specialties in the Vegetable Garden (Vol. IV, p. 217), Mushrooms (Vol. IV, p. 650), and the Culture of Weeds Used in Medicine (Vol. IV, p. 553). In connection with these various industries, however extensively or intensively developed, it will be necessary and desirable to be informed as to the Diseases of Poultry (Vol. II, pp. 554-609), Methods of Preserving Eggs (Vol. I, p. 625), the Insects Affecting Dooryard Plants (Vol. VI, p. 270), and House Plants (Vol. VI, p. 256). And finally the housewife will wish and, in fact, may need to be equipped to fight Household Pests, which are discussed in Vol. VI on page 328, and, under the headings Rats and Ants on pages 672 and 676 of Vol I.

CHAPTER III

WHAT THE FARM HOLDS FOR BOYS AND GIRLS

All of us, probably, have known public speakers to win enthusiastic applause by fervent and touching references to "boys and girls—the best crop on any farm." The simile is excellent; the trouble is that people, especially farmers, accept it and agree with the sentiment, but don't come within a mile of living up to it. That is, however sincerely they may believe the statement, in many cases they do so wholly in theory. Crops, for instance, are fed and cared for, their environment is made and maintained as favorable as possible, weeds are kept down, and a moisture supply kept up; no step that can increase growth, development, value, and efficiency is neglected. And so it is in even greater degree with a prize colt or calf, a record-promising heifer, or a highly-bred pig.

How many farm children, on the contrary, are fed, sheltered, and clothed—in a way—and then left to grow up more like weeds than like crops? *Except* that whereas plant weeds are let alone, these human weeds, as soon as they are old enough to be useful, are, whether consciously or not, grouped with and treated as part of the work stock. There are pigs and chickens to be fed, cows to be gone after, butter to be churned, seed potatoes to be cut, onions to be weeded, the garden to be hoed, wood to be chopped and carried, dishes to be washed—innumerable tasks like these always waiting, and, as "they ain't hard work, why let the children do 'em; it'll keep 'em out o' mischief."

THE CHILDREN'S SHARE IN FARM WORK

Of course there *is* something in each of the clauses of that argument. Light tasks *are* better suited to small hands and active bodies, and there *is* such a thing as too much leisure and idleness; besides, if the farmer and his wife are constantly busy, why should not the rest of the family be doing their share?

The difficulty is in determining what *is* a fair share for the juvenile members of the farm family. Think again of the show colt and the prize heifer (which in this respect are even more analogous to the children than the hypothetical crop we started with). Their life of active labor, whether in the show ring, before the plow, or at the milk pail, ranges from five to ten years, beginning only after the animal has enjoyed anywhere from one to three years of absolute freedom and, at most, a little light, preliminary training. A period of anywhere from ten to thirty per cent. of its working lifetime is therefore spent simply in growing, developing, and enjoying itself. This is not only fair, it is good farming and good business: it *pays*.

What, then, is the justification, the logic, the profit, the sense, indeed, of trying to get every ounce of work out of the boy or girl from the earliest possible opportunity? His or her productive, efficient lifetime may be thirty, forty, fifty years or even longer; it represents, not a few records or show-ring prizes or the accomplishment of so much physical labor, but a widespread, permanent influence on other human beings, the actual management of the farm and home later on, a share in the government of the nation and the development of the community, the maintenance of the name and honor of the family. Doesn't this sort of responsibility warrant a period of free, untrammelled growth, and another of careful, systematic training, with generous, appreciative treatment meanwhile?

This may seem like making much noise about a comparatively unusual condition, but let those who think so go into the really rural districts where extension work, county agents, and reading courses have not penetrated, and then work gradually back into the communities where farms are more developed and more successful, or where they are being established by the newer generations with modern ideas. Two conditions will give a new idea of child life on farms. The first will be the pitiful, abject, slavish lot of the boy and girl so prevalent in the more remote regions; and the second will be the remarkable extent to which such conditions obtain on occasional farms as you approach the more highly developed, more modern—one might even say, more "civilized" localities.

HOW ABOUT THE COUNTRY SLUMS?

At this point you will probably insist that there are just as many slums in the cities as in the country; that child labor in factories is just as common, just as hard, and just as reprehensible as child labor on farms; and that it isn't the amount of work that drives children from the farm, but the inaccessibility and scarcity of amusements, the monotony and uninteresting nature of the work and the environment, and the lack of any return or wage for their efforts.

Granting the truth of these things, the fault is *not* with the farm, but with the farmer or whosoever causes it to appear monotonous and ugly in the children's eyes. In a word, the farm, any farm, is not of itself uninteresting, monotonous, or without recreation possibilities. Far from it; the farm holds, for any boy and girl, a life of fascinating experiences, of pleasurable duties and profitable pleasures, of education in science, art, business management, and character building, a life of which any man or woman can proudly strive to become worthy, and of which, in the living of it, one can be rightfully proud. To open the gateway to this life is another of the purposes of the *Farmers' Cyclopedia*.

THE SORT OF CARE THAT COUNTS

These thoughts that we have been sharing have been in the minds of the scores of men and women who helped make the *Cyclopedia*.

Let the latter therefore be a guide for the farmer and his wife in opening this new life to, and creating this wonderful opportunity for, their children. Let them read other opinions on the problem of Keeping Boys on the Farm (Vol. VII, p. 76) and on the Treatment of Children (Vol. VII, p. 672). They have studied the balancing of rations for hens and cows, let them look into the Food Requirements of Boys and Girls (Vol. VII, p. 638). Let them give a thought to the arrangement and decoration of their Bedrooms (Vol. VII, p. 107) and to the suitability of their Clothing (Vol. VII, p. 669), more than is necessary in merely cutting down a pair of father's overalls. The "modern improvements," such as lighting, heating, water, and sewage systems referred to in Chapter III, will all have an important bearing on the children's attitude toward life, not to speak of their health. Indeed, a Shower Bath for the Boys (Vol. VII, p. 669), that can be made in an hour at almost no cost, may prove a greater physical, mental, and moral stimulus than the overbusy parents ever dreamed of. (However, let it supplement but not replace an occasional visit to the swimmin' hole.)

These parents, we are assuming, prefer having their children at home evenings rather than chasing to the nearest town, to the "movie show," or a dance hall at every opportunity. This is natural and proper, but why not put a revised interpretation on "having the children at home"? Why not, instead of having this mean every evening in the sitting room with father invariably reading his farm paper and mother sewing or knitting or darning, let it mean an occasional jaunt for the whole family—perhaps to a "movie," perhaps to some neighbor's home, perhaps to a grange or an institute or a corn club meeting. Don't try to shut the world out only to have it sneak in secretly, hiding its vices under a cloak of attractive novelty; but let the whole family go out into it together, find that which is good and useful and enjoyable, and bring it back to be part of their farm and home and family life.

THE NEW AGRICULTURAL EDUCATION

Such worth-while features are the Traveling and other Agricultural Libraries (Vol. VII, p. 694), Agricultural Fairs (Vol. VII, p. 672), Farmers' Institutes (Vol. VII, p. 678) and Institutes for Women (page 692), Boys' Corn Clubs (Vol. IV, p. 303, and Vol. VII, p. 691), Girls' Canning Clubs, and the many sorts of organizations and activities that combine social intercourse and education.

It is in relation to the latter—to education—that the farmer's duty to his sons and daughters is greater than it has ever been. First, because theoretical knowledge and a systematic course in "learning how to learn" are essential to-day as never before, whether on the farm or in any other vocation; second, because the facilities for practical, thorough education have been multiplied and developed until they are within the reach of all. Truly the noble aim of Ezra Cornell to "found an institution where any person can obtain instruction in any subject" has become the keynote of modern agricultural teaching. There are the public and normal schools in which

elementary agriculture is taught (Vol. VII, p. 689), the Agricultural High Schools (page 688), and the Agricultural Colleges and Experiment Stations (pages 683-685, 696-697), and Colleges of Forestry (Vol. V, p. 437), which in a score of ways, through many channels, are carrying the light of knowledge to the aid of every individual who desires it and will make an effort to take it. Let farm fathers and mothers read the brief sketch of the History of Agricultural Education (Vol. VII, pp. 675-698) and, while they give thanks for living in this era of free knowledge, determine to take full advantage of its opportunities.

But they need not look outside for all that is to be learned. Let them look closer, even within the boundaries of their own farm, and discover a text-book therein that is as wide as man's experience; a teacher that excels all others—for it is Nature herself. And then there are her two assistant instructors, one at times severe but always just—Experience; the other ever present, ever sympathetic—one's Interest in one's own work and property.

In urging this realization of the value of the farm as a school, let me quote Dr. Liberty H. Bailey, for many years Dean of the College of Agriculture of Cornell University:

THE EDUCATIONAL OBLIGATION OF THE FARMER

“The farmer, as well as the colleges, carries a natural responsibility toward the development of a better agricultural civilization. Merely to be a good farmer is not a sufficient object in life. Even though we develop ideal schools and colleges in which agricultural training and education have an important part, the farmer himself will still carry the obligation to aid in the process of education.

“If the college of agriculture supplies the student with the principles and theory, with accurate knowledge, with the outlook and the will, with the trained intelligence, and with manual skill in a good number of special operations, it is equally the duty of the farmers of the country to provide the means of supplying the necessary actual farm practice that is required to make the rising generation effective countrymen.

“There are some things that a student should know before he ever goes to college. If he is a farm boy he ought to know how to harness a horse, to plow, to plant, to harvest, and to perform all the customary operations of the farm. The farmer cannot delegate the responsibility of training his sons in these arts. After such a young man has completed his college course, he ought to be able to go directly back to the farm and execute a great deal of what he has learned. If he is obliged to seek work, he should be able to find it on any good farm that is in need of labor.

HOW A CITY BOY CAN LEARN FARMING

“If a student is not farm-reared, he must then secure his farm practice by working on an actual farm for a year, more or less. It would be much better if he were to have this practical farm experience

before he ever goes to college. It is necessary that he not only have knowledge and skill in the farm operations, but he should also be fully informed of the rural mind. If he does not secure the farm training before he goes to college, then he must get it after he graduates and before he takes up a farm of his own or before he expects to become a manager of a farm. In some cases, students drop out for a year of the course and secure their experience; this is often a better practice than to leave the farm training until after the end of the course. Some students get their farm practice by spending their summer vacations in this work, but this ordinarily does not produce the best results, although there are some city boys so apt and industrious and adaptable as to enable them to secure the practical side by means of vacation work.

"I have said that the farmers of the country cannot escape their responsibility in the education of the rising generation of persons who are to be farmers. I mean exactly what I say. The colleges of agriculture alone cannot handle the situation. Every good farm is not only an object-lesson, but it ought to contribute something toward the advanced training of at least one young man in agricultural lines. We must have enough farmers with public spirit to provide the farm training that the educated man must have; and the farmer must feel that he is under responsibility to coöperate with the colleges and schools to help the student. I do not mean that he shall be a philanthropist in the ordinary sense, but he must recognize the fact that even though a student may not be skilled in every particular and may not earn much wages, he is bound to teach such student, if he takes him, to the best of his ability. This will do much for the farmer as well as for the student.

"In parts of the Old World farmers take students as apprentices, the student paying the farmer what it is worth for the privilege and for his counsel and direction. I wish that such a practice were developed in this country for those persons who are wholly unfamiliar with farming operations, and who want to do the actual work. But I also wish that farmers were more ready to take one or two students, when they are able to do so, and to give them counsel and advice, and to help them to learn the business, and then pay the student what he earns.

"I think that farmers do not sufficiently realize how much they have to contribute, or how important their farms are educationally. Every good farm has many of the elements of a good school. If the college has much to give, so has the farm much to give, and the farm is making a very real contribution to society. It is of the first importance that as many students as possible come in actual contact with good farms and active farmers."

THE FARM AS A SCHOOL

Thus the way to use this veritable "farm school" is to let it illustrate and explain the theories and facts that are found in books—the *Farmers' Cyclopedia* foremost among them. Read about Soils, Their History (Vol. VII, p. 311), what they are (page 307), and what

kinds there are (pages 310 to 345); then study those of your fields and your neighbors'; strive to identify the type, and by observing its condition consider what treatment it calls for and what fertilizers (page 444). Compare your cropping system with that which has permitted the cultivation of a field for 4,000 years (page 360). Then go deeper and contrast the appearance, nature, formation, and value of the Subsoil (page 312).

For the study of plants and their forms and families there is material in abundance not only among the farm crops, cereals, vegetables, fruits, etc., that have been referred to in previous chapters, but in the innumerable, often insignificant, Weeds (Vol. V, pp. 530-565), many of which exhibit marvelous powers of endurance, adaptation, and vigor. The threatening subject of Plant Pathology becomes much simpler when studied gradually and practically under the title Plant Diseases (Vol. VI, pp. 425-675), and with the help of some smutted grain heads from the twenty-acre lot, scabby apples or potatoes from the pile of culls, or such other specimens as can all too often be found about the farm.

Then there is the vast field of Animal Life, beginning, if you wish, with microscopic Bacteria (Vol. I, p. 202; Vol. III, p. 150; Vol. VI, p. 441; Vol. VII, pp. 495, 524, 527)—so small you cannot see them—and decide whether they are plants or animals, and then progressing into the world of Insects (Vol. VI, pp. 17-424). There is some chemistry, too, to be learned before we go farther, in the problems that deal with the making and use of Spray Mixtures (Vol. VI, pp. 33, 114, 150, 158, 177, 249, and Vol. VII, p. 609) for both insect and disease pests. The next steps would be to Birds (Vol. I, pp. 630-648) and then to the lesser wild creatures of the countryside—Bats (Vol. I, p. 652), Gophers (page 675), Rabbits (page 667), Prairie Dogs (page 673), Toads (Vol. I, p. 651; Vol. II, p. 582), Foxes (Vol. I, p. 653), and all the rest.

LEARNING BY DOING—AND OWNING

Long before this, presumably, our boys and girls will have become acquainted with the larger animals, but it is not fair that they should always have to study someone's else horse or calf or lamb, any more than that a corn club boy should be expected to learn how to raise corn from the plantings of others. Let them have an actual, tangible interest and stimulus, therefore, in the ownership of something alive—a pig, a calf, a colt, lamb, some hens, or turkeys, or a dog—whatever they seem instinctively to turn to. Let this be a permanent gift, not a loan; let the boy dispose of his pig when it is fat, and the girl her eggs or day-old chicks, and let them *keep* what these bring, whether it be bitter experience that will lead to more careful work next time or cash.

When the actual need arises, if not before, let them learn by doing, what to do to stop the flow of blood from a Barbed-Wire Cut (Vol. II, p. 169), or how to tell a Bruise (page 173) from a Fracture (page 224); let them find out how to keep the cat or dog free from Parasites (Vol. III, p. 657) and teach them to diagnose real diseases

instead of attributing the poor condition of the heifer to Hollow Horn (Vol. III, p. 86), Wolf in the Tail (page 89), or any such fallacious ailment.

As the pig or sheep grows, look up the Score Card (Vol. I, pp. 399, 423, etc.) for the breed, and let the youngster discover wherein his animal is lacking and how the deficiency can be remedied in future breeding.

WORK *versus* DRUDGERY

All this means work for the children, you say. Of course it does. But such work with *their* animals, and *their* gardens and crops, isn't drudgery, and drudgery is the element that makes farm life bitter. If there is a fence or a shed to paint, the boy can help, and will be glad to do so, provided he is given a good brush for his own, and is shown how to take care of it, "like real painters do" (Vol. VII, p. 62). He will find it less tiresome to run the cultivator or operate the hay rake if you and he read the History of Farm Machines (Vol. VII, p. 84), so that his mind will have something to munch on while he is physically busy. He will remember to put away tools, at least he will be more likely to, if he is really instructed in their use and care and told of their different adaptabilities (Vol. IV, p. 228; Vol. VII, p. 31). He won't mind gathering eggs half so much if there are trap nests to visit and regular detective records to be kept for each of the hens, with the spirit of competition over all.

So we might go on almost indefinitely, but the principle is ever the same—that knowledge of the subject in hand and ownership of the materials involved add new interest and destroy much of the monotony that would otherwise prove deadening. In other words, returning to our original simile, give the boy and girl crop real cultivation, feed it, water it, aerate and enrich, and keep friable the medium in which it grows. Remember that the harvest is to be measured in terms of ambition, achievement, human lives, and human souls; and that the soil must be fertile, and the care and cultivation tender, just, sympathetic, and constant.

Let the spirit of the farm be reflected from the minds and hearts of the parents into the minds and hearts of the boys and girls; and let that spirit be one of progress, of industry, of knowledge, and of everlasting pride in the nobility of their vocation.

CHAPTER IV

HOW THE NATION AND STATES ARE HELPING

Since the Federal and State Departments of Agriculture and the State Agricultural Experiment Stations form the source of the countless publications around which the *Farmers' Cyclopedia* has been built, it is well that every farmer should gain a clearer idea of what those agencies are doing and how they go about doing it.

THE FEDERAL DEPARTMENT OF AGRICULTURE

The U. S. Department of Agriculture, it may be unnecessary to recall, comprises the office of the Secretary (who is a member of the President's Cabinet), thirteen Bureaus or Divisions, a Library, and a group of seven Advisory Boards. These subdepartments, with their ranking officials (in 1914-15) and a brief statement of their purposes, are as follows: *

Office of the Secretary

SECRETARY OF AGRICULTURE, David F. Houston.

The Secretary is charged with the work of promoting agriculture in its broadest sense. He exercises general supervision and control over the affairs of the department and formulates and establishes the general policies to be pursued by its various offices and branches.

ASSISTANT SECRETARY OF AGRICULTURE, Carl Schurz Vrooman.

Aside from becoming Acting Secretary in the absence of the Secretary, the Assistant Secretary is charged with certain special duties, such as supervision of the scientific and technical investigations of the department, clerical and minor changes in the personnel of the department, the publications of the results of technical investigations, the preparation of annual reports, etc.

CHIEF CLERK, Robert M. Reese.

SOLICITOR, Francis G. Caffey.

APPOINTMENT CLERK, R. W. Roberts.

OFFICE OF INFORMATION, G. W. Wharton, *Chief*.

Established to secure the widest possible circulation of the department's discoveries and recommendations. Practically a publicity office.

* From the 1915 *Garden and Farm Almanac*; 25 cents; Doubleday, Page & Co., Garden City, N. Y.

OFFICE OF MARKETS, Charles J. Brand, *in charge*.

Designed to study market conditions, methods of grading, standardizing, packing, and shipping, and the transactions between producer and consumer of farm products.

FOREST APPEALS, Thomas G. Shearman, *in charge*.

For the investigation of appeals from decisions of the Forest Service.

RURAL ORGANIZATION SERVICE, T. N. Carver, *Director*.

Designed to promote business organization among farmers in the fields of marketing, finance, insurance, coöperative buying, and coöperative production.

OFFICE OF EXHIBITS, F. Lamson-Scribner, *Special Agent*.

Bureaus and Divisions

WEATHER BUREAU, Charles F. Marvin, *Chief*.

Has charge of weather forecasting, issue and display of forecasts, storm, and flood warnings; gauging and reporting of weather stages; maintenance and operation of its telephone and telegraph lines; meteorological observations, etc. It includes the following divisions: Forecast, River and Flood, Climatological, Instrument, Telegraph, Library, Office of Editor, Printing, Stations and Accounts, the Mount Weather Research Observatory, Mount Weather, Va., and local stations in forty-four sections of the country.

BUREAU OF ANIMAL INDUSTRY, A. D. Melvin, *Chief*.

Has charge of the work of the department relating to live stock. Deals with the investigation, control, and eradication of animal diseases, the inspection and quarantine of live stock, the inspection of meat and meat-food products, and with animal husbandry and dairying. It includes these divisions: Animal Husbandry, Biochemic, Dairy, Field Inspection, Meat Inspection, Pathological, Quarantine, Zoölogical, Editorial Office, and an Experiment Station.

FOREST SERVICE, Henry S. Graves, *Forester*.

Administers the national forests, studies forest conditions, and methods of forest utilization, the properties of woods, the manufacture of forest products, and gathers and disseminates information pertaining to these matters and the relation of forests to the public welfare. Its organization is divided into the following: Office of the Editor, Branch of Operation, Branch of Lands, Branch of Silviculture, Branch of Grazing, Branch of Products, Industrial Investigations, and an office handling the Acquisition of Lands under the Weeks Law.

BUREAU OF PLANT INDUSTRY, William A. Taylor, *Chief, and Pathologist and Physiologist*.

Studies plant life in all its relations to agriculture, through offices and divisions as follows: Laboratory of Plant Pathology,

Pathological Collections and Inspection Work, Fruit-Disease Investigations, Forest Pathology Investigations, Cotton and Truck Disease and Sugar Plant Investigations, Crop Physiology and Breeding Investigations, Soil Bacteriology Investigations, Acclimatization and Adaptation of Crop Plants and Cotton Breeding, Drug-Plant, Poisonous-Plant, Physiological and Fermentation Investigations, Grain Standardization, Agricultural Technology, Biophysical Investigations, Seed Testing Laboratories, Cereal Investigations, Corn Investigations, Tobacco and Plant Nutrition Investigations, Forage Crop Investigations, Alkali and Drought Resistant Plant Breeding Investigations, Economic and Systematic Botany, Farm Management Investigations, Farmers' Coöperative State Demonstration Work, Dry-Land Agriculture Investigations, Western Irrigation Agriculture, Horticultural and Pomological Investigations, Experimental Garden and Grounds, Congressional Seed Distribution, Foreign Seed and Plant Introduction, and Arlington Experimental Farm.

BUREAU OF CHEMISTRY, Carl L. Alsberg, *Chief*.

Deals with questions of agricultural chemistry of public interest, analytical work, investigations under the food and drugs act, etc. Its divisions are: Office of General Administration, State Coöperative Food and Drug Control, and the Animal Physiological, Chemical, Bacteriological, Beverage, Carbohydrate, Citrus By-Products, Contracts, Dairy, Drug, Food Control, Food Investigation, Fruit and Vegetable Utilization, Leather, and Paper, Microchemical, Nitrogen, Organic Investigation, Pharmacognosy, Pharmacological, Plant Chemical and Miscellaneous Laboratories. In connection with Field Investigation Work, there are the Ethnological and Food Research Laboratories, the Food and Drug Inspection, and a corps of collaborating State officials.

BUREAU OF SOILS, Milton Whitney, *Chief*.

Investigates the relations of soils to climates, and the texture and composition of soils in field and laboratory; maps the soils of the country; studies the cause and means of preventing the rise of alkali in irrigated soils and the relation of soils to seepage, drainage, etc. Its work is done by Laboratories, a Soil Survey Division, and a Fertility Investigations Division.

BUREAU OF ENTOMOLOGY, L. O. Howard, *Chief*.

Studies insects; experiments with the introduction of beneficial species; tests insecticides and insecticide machinery; and identifies specimens sent in by inquirers. Its investigations are grouped as follows: Insects Affecting Southern Field Crops, Cereal and Forage Insects, Insects Affecting Deciduous Plants, Insects Affecting Tropical and Subtropical Fruits, Truck Crop and Stored-Product Insects, Forest-Insects, Insects Affecting Shade and Ornamental Trees, Insects Affecting the Health of Man and Animals, Bee Culture, Gypsy Moth and Brown Tail Moth, and Miscellaneous.

BUREAU OF BIOLOGICAL SURVEY, Henry W. Henshaw, *Chief*.

Deals with (1) the study of birds and mammals in their relation to agriculture, (2) the making of biological surveys, and (3) the carrying into effect of the Federal protectory game laws.

DIVISION OF ACCOUNTS AND DISBURSEMENTS, A. Zappone, *Chief*.

DIVISION OF PUBLICATIONS, Jos. A. Arnold, *Editor and Chief*.

Conducts all business of the department transacted with the Government Printing Office, and the preparation and distribution of free publications. (For publications for which charge is made, address the Superintendent of Documents, Government Printing Office.)

BUREAU OF CROPS ESTIMATES, Leon M. Estabrook, *Chief*.

Issues monthly crop reports, prepares statistical matter for the Year-book of the department, and makes investigations and estimates as required. Its work is done by a Crop Reporting Board, a Division of Forecasts, a Division of Estimates, and a Field Service.

LIBRARY, Claribel R. Barnett, *Librarian*.

OFFICE OF EXPERIMENT STATIONS, A. C. True, *Director*.

Coöperates with State agricultural colleges and experiment stations and issues the *Experiment Station Record*. Its organization includes Relations with Institutions for Agricultural Research, Editorial Division, Division of Insular Experiment Stations (Alaska, Hawaii, Porto Rico, and Guam), Relations with Agricultural Colleges and Schools, Relations with Farmers' Institutes, Nutrition Investigations, Drainage Investigations, and Irrigation Investigations.

OFFICE OF PUBLIC ROADS, Logan Waller Page, *Director*.

Studies systems of road management and methods of road building, improvement, and maintenance; details engineers to assist local officials in road work; tests road materials; conducts a one-year post-graduate course in highway engineering; prepares and exhibits models of road construction, etc. It includes divisions for Road Management, Road Building and Maintenance, Road Material, and Field Investigations.

Advisory Boards

COMMITTEE ON BUILDINGS.—R. M. Reese (*Chief Clerk*); Leon M. Estabrook (*Bureau of Statistics*), and James E. Jones (*Bureau of Plant Industry*).

INSECTICIDE AND FUNGICIDE BOARD.—J. K. Haywood, M. B. Waite, H. L. Quaintance, James A. Emery, and J. G. Shibley.

Created to assist in the enforcement of the insecticide act of 1910.

FEDERAL HORTICULTURAL BOARD.—C. L. Marlatt, W. A. Orton, George B. Sudworth, W. D. Hunter, and H. V. Steubenrauch.

Created to assist in the enforcement of the plant quarantine act of 1912.

REFEREE BOARD OF CONSULTING SCIENTIFIC EXPERTS.—Drs. Ira Remsen, Johns Hopkins University; R. H. Chittenden, Yale University; John H. Long, Northwestern University Medical School; Alonzo E. Taylor, University of Pennsylvania, and Theobald Smith, Harvard University.

Created to consider questions arising in the enforcement of the food and drugs act of 1906, referred to it by the Secretary of Agriculture.

BOARD OF AWARDS.—R. M. Reese (*Chief Clerk*); C. C. Carroll (*Bureau of Animal Industry*), and F. E. Meloy (*Bureau of Plant Industry*).

Opens, examines, and reports upon informal bids and proposals for furnishing supplies and rendering services.

COMMITTEE ON EDITING OF THE JOURNAL OF AGRICULTURAL RESEARCH.—Karl F. Kellerman, E. W. Allen, and Charles L. Marlatt.

COMMITTEE ON MANUSCRIPTS.—William A. Taylor, Milton Whitney, and Jas. A. Arnold.

Passes upon manuscripts submitted for publication by the department, reporting to the Assistant Secretary of Agriculture.

Permanent Field Stations and Experimental Farms

MOUNT WEATHER METEOROLOGICAL RESEARCH OBSERVATORY, MOUNT WEATHER, VA.—Wm. R. Blair, *in charge*.

HORSE-BREEDING DISTRICT FARMS.—First (Morgan Horse Farm), Middlebury, Vt., W. F. Hammond, *in charge*; second, Front Royal, Va., H. H. Reese, *in charge*; third, Lexington, Ky., R. G. Lawton, *in charge*; Colorado Horse-Breeding Station, Fort Collins, W. P. Little, *in charge*; Experiment Farm, Beltsville, Md., E. L. Shaw, *in charge*.

FOREST SERVICE DISTRICTS AND DISTRICT FORESTERS.—1. Idaho, Montana, North and South Dakota; F. A. Silcox, Missoula, Mont. 2. Colorado, Kansas, South Dakota, Wyoming, Minnesota, and Michigan; Smith Riley, Denver, Colo. 3. Arizona, New Mexico, and Oklahoma; A. C. Ringland, Albuquerque, N. M. 4. Utah, Arizona, Nevada, Idaho, and Wyoming; E. A. Sherman, Ogden, Utah. 5. California and Nevada; Coert Du Bois, San Francisco, Cal. 6. Washington, Oregon, California, and Alaska; George H. Cecil, Portland, Ore. 7. Arkansas and Florida; H. O. Stabler, Washington, D. C.

ARLINGTON EXPERIMENTAL FARM, Arlington, Va., E. C. Butterfield, *in charge*.

PLANT INTRODUCTION FIELD STATIONS.—Chico, Calif., R. L. Beagles, *in charge*; Miami, Fla., Edward Simmons, *in charge*; Bellingham

Wash., H. E. Juenemann, *in charge*; Rockville, Md., John M. Rankin, *in charge*; Brooksville, Fla., W. H. F. Gomme, *in charge*; Buena Vista, Fla., ———, *in charge*.

Officials of the Department of the Interior Having to Do with Agriculture

SECRETARY, Franklin K. Lane.

COMMISSIONER OF THE PUBLIC LAND OFFICE, Clay Tallman.

DIRECTOR OF THE GEOLOGICAL SURVEY, George Otis Smith.

RECLAMATION SERVICE: Director, Frederick H. Newell. Statistician, C. J. Blanchard. Division Supervising Engineers: F. W. Hanna, Phoenix, Ariz.; E. G. Hopson, Portland, Ore.; H. N. Savage, Great Falls, Mont.; R. F. Walter, Denver, Colo.; F. E. Weymouth, Boise, Ida.; C. H. Swigart, North Yakima, Wash.

WHAT RURAL LIFE MEANS

Of additional interest in this connection are the following extracts taken from an address on "What the Government Is Doing for the Farmer," made at the 1914 National Dairy Show by Secretary of Agriculture Houston:

"Up to the last two or three years, unquestionably attention was directed too exclusively merely to the production side of rural life. The slogan was 'make two blades of grass grow where only one grew before' and individualism characterized thinking and acting. Obviously, there is more to rural life than the mere increase of crops and animals, important as this is; more even than increase in production and the finding of markets; more than a matter of profits and even of justice in distribution; and to limit the attack on the rural life problem merely to these phases of it is inadequate and wasteful. It is necessary to look at this side of our national economy in its larger aspects as well, and while not neglecting the older forms of activity to do all in our power to organize rural life, to develop the moral, the intellectual, and the broader economic, governmental, and social interests. For, in the rural district, no less than in the urban district, it is life and that more abundantly which we are interested in, and to which all the material things must minister, and certainly the time has come to bring it about that all the fruits of modern civilization shall not accrue to the towns and cities. The neglect of rural life by the nation has not been conscious or willful. We have been so bent on building up great industrial centers, in rivaling nations of the world not so fortunately circumstanced agriculturally, in manufacturing, fostering it by every natural and artificial device we could think of—so busy trying to make each city larger by a half million or more people for the next

census, that we have overlooked the very foundations of our industrial existence. It has been assumed that we have had a natural monopoly in agriculture, that it could take care of itself, and for the most part we have cheerfully left it to do so; and, too, recklessness and waste have been incident to our breathless conquest of a continent. And so, as the President recently said: 'It has, singularly enough, come to pass that we have allowed the industry of our farms to lag behind the other activities of the country in its development. . . . Our thoughts may ordinarily be concentrated upon the cities and the hives of industry, upon the cries of the crowded market place and the clangor of the factory, but it is from the quiet inter-spaces of the open valleys and the free hillsides that we draw the sources of life and of prosperity, from the farm and the ranch, from the forest and mine. Without these every street would be silent, every office deserted, every factory fallen into disrepair.

"We rejoice over the prosperity and the progress of American agriculture, which on the whole are marked. We witness a vast expenditure of money to foster agriculture through all sorts of scientific and practical measures on the part of the States and of the Federal Government. We are grateful for the fact that while the leading civilized nations of the world are in the throes of a deadly and destructive war, this nation is at peace and the American farmer is receiving increasing compensation for his effort and is permitted to enjoy his work and the fruits of it free from the burden of militarism, and without threat of wholesale destruction of life and of property. No thoughtful man can fail to be optimistic over the situation and the prospects, but optimism should not blind us to the seriousness of certain problems.

THE AMERICAN FARMER AND HIS EFFICIENCY

"With all our efforts, while we witness an increasing diversification of agriculture and both a relative and absolute increase in many of our important lines of production, such as wheat, forage crops, fruits, dairy products, and poultry, we still note not only a relative but also an absolute decrease in a number of our important staple food products, such as corn and meats. In the former, in the last 15 years, there has been no substantial advance. In cattle, sheep, and hogs, there has been an absolute decline—in cattle from the census year 1899-1909 of from 50 million head to 41 million; in sheep of from 61 million to 52 million; of hogs from 63 million to 58 million, while population has increased 16 million. Remember that this situation appears not in a crowded country, but in one which is still in a measure being pioneered; in one in which, with 935 million acres of arable land, not over 400 million or 45 per cent. is under cultivation; in one in which the population per square mile does not exceed 31 and ranges from .7 of one per cent. in Nevada to 508 in Rhode Island. What is the trouble? Is it that the American farmer has not as much intelligence or as high a degree of efficiency as those of other nations? I would resent on behalf of the American farmer such an imputation and the facts contradict it. It is true he does

not produce as much per acre as the farmer in a number of civilized nations—but production per acre is not our standard. It is production per person engaged in agriculture and by this test he is from two to six times as efficient as most of his competitors. And I have not the slightest doubt that the ensuing years will make it clearer that the American farmers can hold their own in free competition with those of the rest of the world and not only retain in large measure a monopoly of his own rapidly growing home market but also supply a considerable part of the foodstuffs consumed by the world. Relatively speaking, extensive farming is still economically the sound programme for the American farmer, but it is becoming decreasingly so; and the aim must be, while maintaining supremacy in production per man, to assert supremacy in production per acre. The continued solution of the problem here suggested is one which now seriously engages the attention of the Federal Government as well as the governments of the States.

THE GOVERNMENT AND INCREASED PRODUCTION

“Through every promising approach the Government is studying and attacking the problem of increasing production. Through cultural methods and the control of plant diseases and plant insects the experts in Plant Industry are lending their assistance. They are suggesting improved varieties of staple crops, introducing new ones, encouraging standardization and pointing out methods of protection from plant diseases and plant insects; and the requisite quarantine measures are being enforced. They have introduced drought-resisting plants, vastly stimulated the citrus fruit industry, established rice in California, cotton in Arizona, pointed the way to the continued successful growing of cotton in boll weevil districts, introduced the culture of figs in California, protected the farmer against seed adulteration, taken effective steps to safeguard the great potato industry of the nation, and have done many other things the mere mention of which time will not permit.

“Just what factors have brought about the serious situation confronting the nation in its meat supply no one can with certainty define. . . . Certain things, however, are now clear and definite measures for increasing the meat supply are being taken and can be taken with certainty. It is clear that we have been considering the meat supply of the nation too exclusively in terms of the big ranch and of the large animals. Obviously it is important that we should continue to help the cattleman and to develop the ranch, and no pains will be spared to do this. The Government is now spending money to develop the live stock industry in connection with the reclamation projects, and the Department is asking for more. It is attacking the problem of overstocking and overgrazing on the range and in the national forests which furnish pasture for over one million six hundred thousand cattle and horses, and over seven million six hundred thousand sheep and goats. It is demonstrating that under systematic management the grazing value of land can be restored and increased and can produce heavier animals even with

an increased number, and that under proper management the range can be improved faster in use than in idleness.

HOW TO PRODUCE MORE MEAT

“But unquestionably the largest hope for a considerable increase in our meat supply lies in three other directions: First, in systematic attention to the production of larger animals in the settled farming areas of the country, especially in the South. Second, in increasing attention to the smaller animals, such as swine and poultry, and third, in the control and eradication of cattle ticks and hog cholera.

“There is no question that the average farmer in the settled areas of the nation generally can produce a greater number of the larger animals, principally as by-products, to the betterment of his farm economy, and without great increase in expense, and that the farmer in the South in this respect enjoys unusual opportunities. And it is further apparent that the farmers everywhere in the existing state of knowledge can largely increase the supply of swine and poultry products which constitute a large and increasing part of the consumption of the average family, the annual value of the latter alone aggregating half a billion dollars, or 50 per cent. of the aggregate value of the cotton produced in the nation. The last census shows a lamentable neglect of live stock in the South. While the average Iowa farm has six milch cows, in North Carolina and Alabama it has less than two, and in South Carolina one. While the average Iowa farm has 35 hogs, in North Carolina and Alabama it has less than 5, South Carolina less than 4. And while the average farm in Iowa has more than 108 poultry, in North Carolina and Alabama it has less than 20, and in South Carolina less than 17. A well-trained investigator has recently said that the average farm home in Georgia produces less than 2 eggs a week, less than $\frac{2}{3}$ of an ounce of butter, and $\frac{2}{3}$ of a pint of milk a day, and $\frac{1}{3}$ of a hog, $\frac{1}{12}$ of a beef, and $\frac{1}{100}$ of a sheep per year per person, and that the cotton crop of the State does not even approximately pay its food and feed bill. No Southern State is giving the requisite attention either to the production of foodstuffs for human beings or for live stock. A conservative estimate indicates that Texas imports from other States annually more than \$50,000,000 worth of wheat, corn, and oats; Georgia more than \$24,000,000; South Carolina more than \$20,000,000; and 12 Southern States more than \$175,000,000 and \$48,000,000 worth of meats, dairy, and poultry products. It may be admitted that most of these States should not undertake the production of these commodities for foreign or interstate shipment in competition with the great States of the Middle West, but every student must recognize the unwisdom of their failure to produce enough of these things for the consumption of their people and for the laying of the foundation of a prosperous live stock development.

“Too exclusive devotion to a single crop anywhere is unwise in normal times, and is a peril in times of disturbance. It is bound to produce just such a catastrophe as has befallen the South in the

present emergency. It prevents the full utilization of land and labor, fails to fill the gaps in the work schedules, and furnishes no reserve.

ERADICATING LIVE STOCK DISEASES

"But an easier and more definite programme for a large increase in the meat supply involves the eradication of the cattle tick, of tuberculosis, and of hog cholera. The Federal Department of Agriculture inspects meats passing into interstate commerce. In one year it condemned three hundred thousand entire carcasses of animals and five hundred and sixty thousand parts of carcasses. Of fifty-seven million animals inspected in 1914, five hundred and thirty-three thousand were found to be infected with tuberculosis. This disease is increasing. It is estimated that hog cholera caused a loss in 1913 of over six million hogs valued at more than sixty millions of dollars, and that the cattle tick causes an annual loss of from forty to one hundred or more millions of dollars and prevents the proper development of the live stock industry in the infected area. The Government is vitally interested in the control and eradication of these diseases, and for the current year appropriated more than a million and a half dollars for this service and for the development of the dairy industry and animal feeding and breeding, to say nothing of the large item for meat inspection. The most significant new piece of legislation was the appropriation of a half million dollars for hog cholera, which is being used for experimental and other demonstrations in the control of this disease and for the inspection of serum and the protection of the farmer against impotent products. The work of tick eradication is continued. It has resulted in the clearing up and freeing of 223,000 square miles, an area exceeding that of Georgia, Florida, Alabama, and Mississippi combined, or as great as that of Germany or France. At the same rate, with intelligent coöperation, the remaining area, double that of Texas, or that of Germany and France combined, will be free within fifteen years.

"Every effective thing that may be done to stimulate the live stock interests in general will, of necessity, react favorably upon the great industry, the dairy industry, in which you are immediately and specially concerned. The importance of this great interest the Government fully appreciates, involving as it does the handling of twenty-one millions of cows, an annual product of approximately six hundred millions of dollars in value, more than half a billion pounds of butter, half a billion pounds of condensed milk, and a third of a billion pounds of cheese. It is needless for me to tell you that dairying has made marked advance in recent years, but there is much to be done, and the Government is making every effort to assist. It is studying how to reduce cost and to eliminate waste, to develop in those concerned careful business habits, the keeping of exact records and the definite knowledge each day of how their business stands. It is urging the grading of all dairy products, the elimination of waste in milk delivery, the organization of the milk supply, the extension of coöperation in buying and selling, and the extermination of disease in cows, especially of tuberculosis. Along these lines lies

the hope of development and profit both to the producer and consumer.

A NEW ERA IN AGRICULTURAL EDUCATION

“Within the year Congress has enacted a measure of even vaster significance and greater consequence. I refer to the Smith-Lever Extension Bill, which, in my judgment, is one of the most significant educational measures ever adopted by any government. It recognizes a new class of pupils—a class composed of men and women working at their daily tasks on the farm. The Government takes the adult farmer and farm woman, as well as the farm boy and girl, as its pupils. It provides for an expenditure of over eight millions of dollars, partly by the States. It incorporates the most efficient method of conveying information to the farmer, and through the healthful process of coöperation between the State and the nation places the brains of these two great agencies at his disposal, insures efficiency, and eliminates waste and friction. I yield to no man my appreciation of the value of scientific investigation and research, but I am convinced that the great task confronting us now for the betterment of agriculture is to bring to the average farmer what the experts and the best farmers know and to induce them to apply it. If we could secure this we should revolutionize agriculture; and this is the object of the Smith-Lever Bill. It aims to reach the farmer by personal contact, and above all, to bring assistance to the farm woman who has been too long neglected as a factor in the agricultural life of the nation.

MARKETING AND DISTRIBUTION

“But vital as are these problems of production, even more urgent are the problems of marketing and distribution. It has become clear to students of agriculture that further production in many directions waits on better distribution, and that in this field fundamental problems of justice and injustice are involved which demand solution. The time has come to conceive agriculture in all its relations, to conceive it as a unit and not to attend to merely one or a few of its phases. The Government has been quick to see these things. Urgent problems have been pressing upon it for solution, problems of marketing, of distribution, of good roads, of rural finance, and of rural sanitation and health, and the Department of Agriculture has rapidly tended to become, as it should, a great Department of rural economics and of rural life. The Congress now sitting has appropriated two hundred thousand dollars for the study of marketing, passed the Cotton Futures Act, made increased provision for the investigation and promotion of good roads, and has pushed nearly to the point of completion measures for the standardization of grain and for the supervision of its sale in interstate commerce, for the standardization of cotton and for a permissive warehouse system for the leading staple crops. The Office of Markets, although only recently created and necessarily requiring time for the consideration of its projects and

especially for the securing of an efficient staff of experts, has conducted investigations in a great variety of directions, furnished much information to those seeking it; and it will at no distant day extend aid through bulletins and as rapidly as possible through demonstration. It is investigating the proper methods of grading and standardization, packing and shipping, the marketing of special products, transportation and storage problems, city marketing and distribution, including farmers' municipal wholesale and retail market houses, the direct dealings between producers and consumers, and coöperative production and handling of products. It is giving special attention to such details as dockage in the sale of grains, and to the methods and practices of large terminal markets in the practice of mixing. It would unduly detain you if I were to attempt even to outline the other great measures to which I have made reference, such as the Grain and Cotton Standards Acts, the Cotton Futures, and the Warehouse Bills. I shall have to dismiss these measures with the intimation that their object is to do justice as between producer and consumer, to guarantee that the producer shall get a just price for the specific product which he offers for sale, and to the consumer that he shall get the specific product for which he pays his price, that normal and orderly processes shall prevail in the distribution of farm products, and that there shall be added incentive to the farmer to increase in the fullest measure not only the quantity but the quality of his product.

GOOD ROADS

"Intimately involved in both the production and distribution of products is the matter of good roads. Good roads are prerequisite not only to economical production and distribution but also to the furtherance of the educational, social, and sanitary life of the farming districts. The great need is for roads which shall get products from the farm to the nearest railway station and enable the farmer to haul when he cannot be busy about his sowing and reaping, and to haul at a lower rate. The railway will continue for an indefinite time to be the national highway. The emphasis is needed on the community road. It is estimated that it costs twenty-three cents per ton mile to haul under existing conditions on the country road, and that this could be reduced by half if the roads were improved. The question is one partly, of course, of means or of funds, but even more largely of methods, of instrumentalities, and of administration. The nation to-day is spending annually the equivalent of more than two hundred millions of dollars for roads, an enormous increase in the last decade. Much of this is directed by local supervisors and it is estimated by experts that of the amount so directed anywhere from thirty to forty per cent. is, relatively speaking, wasted or misdirected. The first requisite, therefore, is for efficient expenditure and administration, and so far as the Federal Government is concerned, to project it into the situation so as to safeguard the expenditure and to perfect the administration. The Office of Public Roads is at present doing everything in its power to promote the economical building of good roads, and especially to assist in

the development of proper administration. The difficulties are presented mainly in the sphere of State and local administration. Less than half the States at present have an expert highway commission, and none have expert county commissioners. If direct federal aid is to be extended it should be done only under such conditions as will guarantee a dollar's result for every dollar of expenditure. It is clearly undesirable to discourage State and local initiative. Co-operation between the State and the Federal Government is requisite. The State should be the lowest unit with which the federal agency should deal, and the representative in every State should be an expert highway commission. An automatic check to assaults on the federal treasury should be provided, and the requirement that each State makes available at least twice as much as is appropriated by the Federal Government should be imposed. If there were the further provision that the federal funds should be limited to construction projects, and that before federal money is made available for any projects, those projects shall have been mutually agreed upon by the federal agency and the State Highway Commission, with clear understanding as to methods of construction, specifications, materials, and the development of a State system, great benefits might result and dangers would be reduced to a minimum. This same principle of coöperation is embodied in the Smith-Lever Extension Bill; and, in my own opinion, in intelligent coöperation of this sort many of the problems which are presented by our dual form of government will find solution.

“ . . . The Government recognizes as well the broader aspects of rural life. It knows that the genius for organization which has done so much for industry in the nation can be brought to prevail in the sphere of rural life and of agriculture. Extreme individualism in agriculture has had its day. There can be no question that the key to the solution of many of the problems of rural life will be found in some form of concerted action or of coöperation. Some form of organization is as inevitable as it is desirable. Without it the farmer cannot have adequate schools or social life; without it he cannot secure good roads; standarize his products or economically market them; without it he cannot have the proper health facilities or lay the credit foundations which will enable him to secure capital at more reasonable rates. The Congress has recently given concrete expression of its appreciation of these phases of rural life by placing at the disposal of the Department of Agriculture the fund for the study of coöperation, and not only as it affects marketing, but also as it affects other phases of rural activities and especially as it affects rural credits. In addition to recognizing, as the President expresses it, that the farmer ‘is the servant of the seasons,’ and that, therefore, not as a matter of discrimination, but as a matter of equal justice, peculiar consideration should be had for his circumstances and of his credit needs, by providing in the Federal Reserve Act for a longer period of maturity for farmers’ loans and for loans on farm mortgages by national banks within certain limits, Congress has spent many weeks maturing a measure for the creation of land mortgage banks and the Department of Agriculture has made a

special study of coöperative credit associations for the small farmer. There is every reason to hope that in the near future valuable and helpful action will be taken in these two directions.

"Nothing short of a successful attempt to secure these larger results in the rural life of the nation, to organize it, to make it profitable, healthful, comfortable, and attractive, can satisfy any thoughtful and patriotic man. It is the only sure way of developing and retaining in the rural districts of the nation an adequate number of efficient and contented people. That the thought and action of the nation must be along these lines is made clear by the facts I have recited and by the further fact that while the population of the nation in the last 15 years has increased 23 millions, the strictly rural districts have shown an increase of less than 6 millions. We cannot neglect the higher things to which the material minister and which if secured would render much of our other effort unnecessary. The greatest undeveloped resource of any community is its people, and if we devoted more attention to the conservation and development of the people we should be relieved of much of our concern for the conservation and development of our natural resources. An awakening of the mental and spiritual faculties is prerequisite to the success of any educational enterprise, and therefore along with our attempts directly to increase the production of material things, we must minister to the minds and spirits of the rural population. In short, we must see to it that the finer results and the higher things of civilization are not the peculiar possession of urban peoples,—that they do not pass by or over our struggling rural masses. We must see to it that there is within reach of every country boy and girl an opportunity for a sound elementary and secondary school training, that the rural family be protected in its health against the ravages of insects and of disease; that the load be lifted in some measure from the struggling women of the farm, and that the wholesome social attractions of life be made more freely to abound. Any expenditure of effort or money in this direction will not be a burden but an investment, and with such protection the farmers of this nation need not fear the competition of the world and the nation need not fear for its permanency."

As this address was made just before the outbreak of foot-and-mouth disease in the closing months of 1914, the Secretary had no occasion to refer to it. Such an occurrence might, however, be used, and also the history of previous outbreaks, to show the part the National Department of Agriculture plays in such situations and the promptness, energy, and success with which its forces attack the many difficult problems they are called upon to solve. (For a comprehensive review of this, and previous outbreaks of this disease and a discussion of the malady itself, its prevention, and its extermination, see the special insert at the end of Vol. III.)

STATE DEPARTMENTS OF AGRICULTURE

The methods employed by the State Governments in assisting the farmers and promoting the agriculture of their respective common-

wealths differ considerably. In some cases, as New York, Pennsylvania, and Virginia, there is a complete department headed by a commissioner, and including such officials as veterinarian, pomologist, and plant pathologist. In such cases the commissioner has considerable legal authority in such matters as imposing quarantines for animal diseases, prosecuting violations of dairy, nursery, seed, and similar laws.

Another sort of State organization is the State Board, which frequently, as in the case of Massachusetts, Ohio, Missouri, and others, is almost identical in form with the Department just referred to, the Secretary being usually the executive and most important officer; but it may also be merely a body created to manage an annual State Fair, or at most, a sort of publicity committee, which arranges and publishes statistics as to the agriculture of its State, calls attention to its opportunities and interests, and assists farm seekers in settling there.

In several instances the Commissioner of Agriculture is also head of other departments or bureaus, as those of Immigration, Labor, Mines, and Statistics. Finally there are a few States in which no definite step in any of these directions has yet been taken and in which the control of all agricultural interests rests with the State Experiment Station and its Board of Control.

The publications of the State Departments, if any, consist of biennial, annual, quarterly, monthly, or more frequent reports, including analyses of fertilizers, seeds, and stock foods offered for sale in the State, reprints of agricultural legislation, reports of Farmers' Institutes, State Agricultural, Live Stock, Dairy, and Poultry Associations, etc., lists of farms offered for sale, descriptions of the State and its resources, and bulletins dealing with practical farm matters, in many instances extremely valuable to the farmer. Since it is impossible for us to list all the recent publications of this kind it must be left to the individual farmer to address a request for available material to the Department of Agriculture of his State at its capital. In whichever of the several forms mentioned above the organization may exist, such a communication will eventually reach the right official and, in all probability, bring forth generous response.

The usefulness and efficiency of the State Departments is frequently overlooked until such an emergency as the outbreak of foot-and-mouth disease brings them into prominence. It behooves the farmer to remember that in the event of any peculiar or particularly destructive disease of stock or crops or trees appearing on his farm, his State authorities are invariably ready to advise and assist. Not only is it to his advantage to accept this assistance, but it is his duty to seek it lest delay and doubt aid in establishing or disseminating some new and serious pest.

STATE COLLEGES AND EXPERIMENT STATIONS

The advent and development of the Agricultural College and the often closely associated Experiment Station have marked wonderfully important steps in the growth of educational methods. (See Vol.

VII, pp. 383-388.) Nor, as Secretary Houston suggests in referring to the Smith-Lever Bill, has this development yet reached its summit. New means are continually being found or devised for ascertaining agricultural truths and for carrying and explaining them to, and impressing them upon, the practical farmer. Demonstration farms, and county agents, farmers' special trains, Farmers' Week gatherings, extension work in all its branches, bulletins, circulars, reading courses, and short winter courses for farmers of all ages and their wives and daughters, are laying before the man and his family on the farm the invaluable results of years of study and investigation and the expenditure of millions of dollars.

No progressive agriculturist should neglect having his name placed upon the mailing lists of his college and experiment station; nor should he neglect any opportunity to meet and become well acquainted with their staffs. He need feel no diffidence about accepting the assistance they have to offer; indeed he can well repay it by working hand in hand with the institutions of study and research, in practicing the methods that they have proven best, in destroying the blind ignorance and stubborn conservatism that justly make farming an unpopular occupation. "Every farm a laboratory, a classroom, and a demonstration of better farming" should be the aim of our farmers, and it *can* be through the study and application of principles such as those so fully discussed in the *Farmers' Cyclopedia*.

SOURCES OF INFORMATION AND ASSISTANCE IN ALL THE STATES

ALABAMA

Commissioner of Agriculture, *Montgomery*.

Polytechnic Institute, C. C. Thach, President. } *Auburn*.

Experiment Station, J. F. Duggar, Director. }

Agricultural and Mechanical College for Negroes, W. S. Buchanan, President, *Normal*.

Tuskegee Institute for Negroes.

Agricultural School, B. T. Washington, Principal. } *Tuskegee*.

Experiment Station, G. W. Carver, Director. }

ARIZONA

University of Arizona, A. H. Wilde, President. } *Tucson*.

Experiment Station, R. H. Forbes, Director. }

ARKANSAS

Commissioner of Agriculture, *Little Rock*.

University of Arkansas; College of Agriculture and Experiment Station, Martin Nelson, Dean and Director, *Fayetteville*.

CALIFORNIA

State Board of Agriculture, *Sacramento*.

University of California; College of Agriculture and Experiment Station, T. F. Hunt, Dean and Director, *Berkeley*.

COLORADO

Agricultural College, C. A. Lory, President. } *Fort Collins*.

Experiment Station, C. P. Gillette, Director. }

CONNECTICUT

State Board of Agriculture, Secretary, *North Woodstock*.
 Agricultural College, C. L. Beach, President. } *Storrs*.
 Experiment Station, E. A. Jenkins, Director. }
 Experiment Station, E. H. Jenkins, Director, *New Haven*.

DELAWARE

State Board of Agriculture, *Dover*.
 State College and Experiment Station, Harry Hayward, Dean
 and Director, *Newark*.
 State College for Colored Students, W. C. Jason, President,
Dover.

FLORIDA

Commissioner of Agriculture, *Tallahassee*.
 University of Florida; College of Agriculture, J. J. Vernon,
 Dean. Experiment Station, P. H. Rolfs, Director, *Gainesville*.
 A. and M. College for Negroes, U. B. Young, President, *Talla-
 hassee*.

GEORGIA

Commissioner of Agriculture, *Atlanta*.
 College of Agriculture, A. M. Soule, President, *Athens*.
 Experiment Station, R. J. H. DeLoach, Director, *Experiment*.
 University of Georgia; Industrial College for Colored Youths,
 P. R. Wright, President, *Savannah*.

IDAHO

University of Idaho; College of Agriculture, E. J. Iddings, Vice-
 Dean. Experiment Station, J. S. Jones, Vice-Director,
Moscow.

ILLINOIS

University of Illinois; College of Agriculture and Experiment
 Station, Eugene Davenport, Dean and Director, *Urbana*.

INDIANA

Purdue University; School of Agriculture, J. H. Skinner, Dean.
 Experiment Station, Arthur Goss, Director, *Lafayette*.

IOWA

State Department of Agriculture, *Des Moines*.
 College of Agriculture and Mechanic Arts, R. A. Pearson,
 President, *Ames*.
 Experiment Station, C. F. Curtiss, Dean and Director, *Ames*.

KANSAS

State Board of Agriculture, *Topeka*.
 Agricultural College, Henry J. Waters, President. } *Man-*
 Experiment Station, W. M. Jardine, Dean and Director. } *hattan*.

KENTUCKY

State University; College of Agriculture and Experiment Station, J. H. Kastle, Dean and Director, *Lexington*.

Normal and Industrial Institute for Colored Persons, G. P. Russell, President, *Frankfort*.

LOUISIANA

Commissioner of Agriculture, *Baton Rouge*.

Louisiana State University; A. and M. College and Experiment Station, W. R. Dodson, Dean and Director, *Baton Rouge*.

Southern University and A. and M. College, J. S. Clark, President, *Baton Rouge*.

MAINE

Commissioner of Agriculture, *Augusta*.

University of Maine; College of Agriculture, L. S. Merrill, Dean. Experiment Station, C. D. Woods, Director, *Orono*.

MARYLAND

State Board of Agriculture, *College Park*.

Agricultural College and Experiment Station, H. J. Patterson, President and Director, *College Park*.

Princess Anne Academy for Colored Persons, T. H. Kiah, Principal, *Princess Anne*.

MASSACHUSETTS

State Board of Agriculture, *Boston*.

Agricultural College, K. L. Butterfield, President. } *Amherst*.
Experiment Station, W. P. Brooks, Director. }

MICHIGAN

Agricultural Society, *Detroit*.

Agricultural College, J. L. Snyder, President. } *East*
Experiment Station, R. S. Shaw, Dean and Director. } *Lansing*.

MINNESOTA

University of Minnesota; College of Agriculture and Experiment Station, A. F. Woods, Dean and Director, *St. Paul*.

MISSISSIPPI

Commissioner of Agriculture, *Jackson*.

Agricultural and Mechanical College, G. R. Hightower, President. Experiment Station, E. R. Lloyd, Director, *Agricultural College*.

(Other Stations, *Stoneville*, *Holly Springs*, and *McNeill*.)

Alcorn Agricultural and Mechanical College, J. A. Martin, President, *Alcorn*.

MISSOURI

State Board of Agriculture, *Columbia*.

University of Missouri; College of Agriculture and Experiment Station, F. B. Mumford, Dean and Director, *Columbia*.

MONTANA

Commissioner of Agriculture, *Helena*.

College of Agriculture and Mechanical Arts, J. M. Hamilton, President. Experiment Station, F. B. Linfield, Dean and Director, *Bozeman*.

NEBRASKA

University of Nebraska; College of Agriculture and Experiment Station, E. A. Burnett, Dean and Director, *Lincoln*.

NEVADA

University of Nevada; College of Agriculture, Robert Lewers, Acting President. Experiment Station, S. B. Doten, Director, *Reno*.

NEW HAMPSHIRE

Commissioner of Agriculture, *Concord*.

College of Agriculture and Mechanical Arts, E. T. Fairchild, President. Experiment Station, J. C. Kendall, Director, *Durham*.

NEW JERSEY

State Board of Agriculture, *Trenton*.

College for the Benefit of Agriculture and Mechanical Arts, W. H. S. Demarest, President. State Experiment Station, J. G. Lipman, Director, *New Brunswick*.

Rutgers Scientific School, Experiment Station, J. G. Lipman, Director, *New Brunswick*.

NEW MEXICO

College of Agriculture and Mechanical Arts, G. E. Ladd, President. Experiment Station, Fabian Garcia, Director, *State College*.

NEW YORK

Commissioner of Agriculture, *Albany*.

Cornell University; College of Agriculture and Experiment Station, B. T. Galloway, Dean and Director, *Ithaca*.

Experiment Station, W. H. Jordan, Director, *Geneva*.

NORTH CAROLINA

Commissioner of Agriculture, *Raleigh*.

College of Agriculture and Mechanical Arts, D. H. Hill, President, *West Raleigh*.

Experiment Station, B. W. Kilgore, Director, *Raleigh* and *West Raleigh*.

Agricultural and Mechanical College for the Colored Race, J. B. Dudley, President, *Greensboro*.

NORTH DAKOTA

Commissioner of Agriculture, *Bismarck*.

Agricultural College, J. H. Worst, President. } *Agricultural*
Experiment Station, T. P. Cooper, Director. } *College*.

OHIO

Agricultural Commission, *Columbus*.

Ohio State University; Colleges of Agriculture and Veterinary Science, W. O. Thompson, President; H. C. Price and D. S. White, Deans, *Columbus*.

Experiment Station, C. E. Thorne, Director, *Wooster*.

OKLAHOMA

Board of Agriculture, *Oklahoma City*.

Agricultural and Mechanical College, L. L. Lewis, Acting President. Experiment Station, W. L. Carlyle, Director, *Stillwater*.

Agricultural and Normal University, I. E. Page, President, *Langston*.

OREGON

Agricultural College, W. J. Kerr, President. } *Cor-*
Experiment Station, A. B. Cordley, Dean and Director. } *vallis*.

PENNSYLVANIA

State Board of Agriculture, *Harrisburg*.

Pennsylvania State College; School of Agriculture, E. E. Sparks, President. Experiment Station, R. L. Watts, Dean and Director, *State College*.

RHODE ISLAND

Board of Agriculture, *Providence*.

State College, Howard Edwards, President. } *Kingston*.
Experiment Station, B. L. Hartwell, Director. }

SOUTH CAROLINA

Commissioner of Agriculture, *Columbia*.

Clemson Agricultural College, W. M. Riggs, President. } *Clemson*
Experiment Station, J. N. Harper, Director. } *College*.

Colored Normal, Industrial, Agricultural, and Mechanical College, R. S. Wilkinson, President, *Orangeburg*.

SOUTH DAKOTA

College of Agriculture and Mechanical Arts, G. L. Brown, Acting President. Experiment Station, J. W. Wilson, Director, *Brookings*.

TENNESSEE

Commissioner of Agriculture, *Nashville*.

University of Tennessee; College of Agriculture, Brown Ayers, President. Experiment Station, H. A. Morgan, Director, *Knoxville*.

TEXAS

Commissioner of Agriculture, *Austin*.

Agricultural and Mechanical College, Charles Puryear, President. Experiment Station, B. Youngblood, Director, *College Station*.

Normal and Industrial College, E. L. Blackshear, Principal,
Prairie View.

UTAH

Agricultural College, J. A. Widtsoe, President. } *Logan.*
Experiment Station, E. D. Ball, Director. }

VERMONT

Commissioner of Agriculture, *St. Albans.*
University of Vermont; College of Agriculture, G. P. Benton,
President. Experiment Station, J. L. Hills, Dean and
Director, *Burlington.*

VIRGINIA

Commissioner of Agriculture, *Richmond.*
Agricultural and Mechanical College, J. O. Eggleston, President.
Experiment Station, L. W. Fletcher, Director, *Blacksburg.*
Truck Experiment Station, T. C. Johnson, Director, *Norfolk.*
Normal and Agricultural Institute, C. K. Graham, Director,
Hampton.

WASHINGTON

Commissioner of Agriculture, *Olympia.*
State College, E. A. Bryan, President. } *Pullman.*
Experiment Station, I. D. Cardiff, Director. }

WEST VIRGINIA

Commissioner of Agriculture, *Charleston.*
West Virginia University; College of Agriculture, T. E. Hodges,
President. Experiment Station, ————— Dean and Di-
rector, *Morgantown.*
Colored Institute, Byrd Prillerman, President, *Institute.*

WISCONSIN

State Board of Agriculture, *Madison.*
University of Wisconsin; College of Agriculture, C. R. Van Hise,
President. Experiment Station, H. L. Russell, Dean and
Director, *Madison.*

WYOMING

University of Wyoming; College of Agriculture, C. A. Duniway,
President. Experiment Station, H. G. Knight, Dean and
Director, *Laramie.*

CHAPTER V

PRACTICAL READING FOR PRACTICAL FARMERS

THE SORT OF KNOWLEDGE THAT COUNTS

“The knowledge we have never realized is not knowledge to us—only knowledge’s shadow,” says Charles Reade. Similarly, we may say that knowledge within reach, but which we are unable to grasp, is only knowledge’s ghost; and that any source of knowledge is no better than a blank page so long as we are unable to draw forth that knowledge and assimilate it. As the cocoanut is valueless unless we are able to get at the meat, as ore becomes useful only when means are found for extracting its treasure, so the *Farmers’ Cyclopedia* is most helpful when the reader is fully able to glean in logical sequence the material that refers especially to his needs and conditions.

It is for these reasons that this Manual and Guide has been prepared, and that, in this final chapter, we shall suggest definite systems or courses of reading for different types of farmer. Not that each individual will not find interest and benefit in many other sections of the books than those mentioned; but as a groundwork for further reading the selections and sequences that follow will help to a decided saving of time and to increase of efficiency.

§ I. THE MAN WHO WANTS A FARM

The very first thing for the man who “has never farmed but wants to” to do is to make absolutely sure that his desire is sincere. It is not enough that he “loves the outdoors,” or “takes a real interest in animals,” or “has a wonderful knack of making things grow in the backyard garden.” All these are desirable attributes in a farmer, but there are many other things he must be and do and realize.

The one sure and essential test of his desire and fitness to be a farmer consists in doing actual farm work and living an actual farm life continuously for at least a year. Nor does this mean visiting at a friend’s country estate, or “spending a vacation up at Uncle Henry’s” or boarding for a season at some rural hotel. The thing for him to do is to get a job as a farm hand, take whatever wages his ability or previous experience warrant, and learn the details of the business from the bottom. They won’t always be pleasant or clean or in accord with his plans and desires at that particular time; but they will teach him the farm point of view—which is an absolute essential—and if, at the end of his period of apprenticeship, he still has a real hankering after farm life, he can pretty safely, and will, look about for ways to get started toward a farm of his own.

SOME FACTS ABOUT FARMING

This farm point of view will carry with it much enlightenment and probably the contradiction of numerous pet theories and suppositions. The practical farm student will learn, for instance, that successful farming means not merely fitting the ground, planting seed, harvesting the crop, and banking the profits; but that the crop must be coaxed and encouraged, weeds, insects, and diseases must be combated, the crop harvested at just the right time (*if* the weather permits), a market found, the crop taken to it and sold, and then, before any profits are banked, or even counted, the many various expenses must be figured and covered, and wages, taxes, and interest paid. He will find that one hen may easily return \$1.50 net profit per year, but that \$1,500 clear from 1,000 hens is an entirely different matter; that getting cream out of a separator is far more simple than getting milk out of a cow; that there's a long road of study and care between the fruit trees just from the nursery and the fruit crop just from the trees. And finally he will learn that though he does not have to punch a timecard every eight hours under the watchful eye of a human boss, he has, nevertheless, to be "on the job" at all hours of the day and night, the servant of, not only his conscience and ambition, but also the farm itself and its every animal and crop and building.

These things he will learn, and many more, but if at heart he is a true farmer they will cause him not sorrow but joy; and the vast promise and reward of an honorable lifework shall be his.

Meantime there are facts and principles to be learned, and here the *Cyclopedia* enters the field. The prospective farmer should know and appreciate the extent of his business in America (see *Agricultural Statistics*, Vol. VII, p. 165). He should study the field of Farming as a Business (Vol. VII, pp. 17-22), including the details of Farm Equipment (page 31), the Water Supply and Its Importance (page 35), Farm Buildings (pages 100 and 131), and Their Surroundings (Vol. V, p. 469) and the Making of the Vegetable Garden (Vol. IV, p. 216), which should be an exceedingly important feature of every country home.

Before leaving the more general considerations he should study also the external factors that affect the business and success of every farm. Such are the problems of Tenant Farming (Vol. VII, p. 253) and the relations between owner and renter, of special importance in that renting offers a desirable way for the beginner to get started; Coöperation (Vol. VII, p. 246), the Forests (Vol. V, p. 319), and their tremendous influence on soils, moisture, floods, etc.; and Roads (Vol. VII, p. 153), which affect directly not only the financial condition of individual farms, but the prosperity, the progress, and the civilization of entire communities.

Next there are the types of farming around which the farmer may plan to develop his business. If well equipped as to experience and practical knowledge, Intensive Farming (Vol. VII, p. 184) is likely to bring him the greatest returns. Where rainfall is somewhat scant two methods offer themselves: Dry Farming (Vol. VII, p. 222) or

the conservation of every available bit of moisture, and Irrigation (Vol. VI, p. 276) or the supplementing of the natural supply by pumps, dams, canals, and other mechanical contrivances. The care of animals, especially a Dairy Herd (Vol. I, p. 138) may appeal to him; the principles of Fruit Growing (Vol. V, p. 17) may prove irresistibly attractive; or the possibilities offered by Poultry (Vol. I, p. 518).

THE ELEMENTS OF FARMING

Going still farther into detail, there are the elements or materials with which any sort of farming is carried on. Most essential, of course, is the Soil (Vol. VII, p. 306), although Fertilizers (Vol. VII, p. 388), by which the soil is modified and improved, are highly important. The maintenance of natural soil fertility can be accomplished largely by a judicious Rotation of Crops (Vol. VII, p. 201), while Methods of Cultivation (Vol. VII, p. 42) must be known whatever crop is to be raised.

The many crops that offer themselves for various purposes—for sale, for stock-feeding, for plowing under, etc.—are too numerous to be listed here, and can be easily located by means of the index. However, after having gleaned from the foregoing references the principles of their growth, it is well to become familiar with the principles that have to do with their destruction, such as those of Insects and Their Effects (Vol. VI, p. 17) and Plant Diseases, Their Nature and Causes (Vol. VI, p. 425). Similarly the theories of dealing with them must be understood. (See Vol. VII, pp. 351 and 656.)

Thus our "going-to-be farmer" can learn many of the facts he must eventually know without having to depend wholly on costly experience. Later, as he decides what phases of farming he will specialize in, he will desire to follow the courses of reading hereafter suggested.

§ II. THE DAIRY FARMER

The dairy farmer, like any other, should begin gradually. That is, he should start with a small number of cows, buildings as inexpensive as is compatible with sufficient shelter, and not too complicated cropping and feeding systems. He can then afford to experiment a little, develop his business according to the demands and opportunities of his locality, and let experience design permanent buildings and equipment to give the maximum satisfaction. There should, however, be no gradual beginning as regards the *quality* of the cattle. The better they are, from the very first, the greater the chances of the farm's success.

PURE-BREDS *versus* GRADES

Whether the cows shall be pure-breds or good grades cannot be settled offhand. A fine grade animal will give as much and as good milk as the average registered cow—sometimes even more—while for

all practical purposes of milk, cream, and butter production, a high-grade herd, continually "graded up" by the use of pure-bred bulls will be fully as satisfactory as a like number of pure-breds. However, the registered animal costs no more to feed and keep than the grade; it is eligible to Advanced Registry tests and subsequent prestige, if successful; and its calves sell for several times as much as the veals or ordinary heifers from the grade herd. The only danger is that the inexperienced breeder shall prove lacking in the skill requisite to manage and keep in condition the highly organized units of a pure-bred herd. It is like a high-power microscope in the hands of a boy; he is liable to damage it in learning how to care for it, unless he has gained experience with simple lenses, and coarser, cheaper instruments. But there is no question about the leader of the herd; the grade or "scrub" bull is an abomination and no farmer who keeps one can hope for maximum success.

Whether or not the herd is pure-bred, it must exhibit to greater or less degree the characters of some one of the Standard Breeds (Vol. I, p. 119); which it shall be, must be decided by the farmer himself, depending upon his plans and preferences.

All are fully described in Vol. I, and their characteristics should be well understood before a choice is made.

THE DETAILS OF DAIRYING

Having become acquainted with breeds, the dairyman should study the Formation and Management of a Dairy Herd (Vol. I, p. 138) and Raising Calves (page 185), and also the problems of Feeding Dairy Cattle (pages 159, 164), in which connection the relation between Water and the Health of the Herd (Vol. II, p. 54) is important. Feeding brings us, of course, to crops suitable for the purpose, and the following references should be consulted before going farther:

| | |
|---|-----------------------|
| Cropping Systems for Dairy Farms . . . | Vol. VII, p. 219 |
| Soiling Crops for Cows | Vol. I, p. 153 |
| Alfalfa for Cows | Vol. IV, p. 48 |
| Hay and Pasture Grasses | Vol. IV, pp. 117, 121 |
| The Orchard as a Pasture | Vol. V, p. 38 |
| Pea Vine Silage | Vol. VII, p. 49 |
| Terms Used in Feeding Matters | Vol. VII, p. 251 |
| The Silo and Silage | Vol. VII, p. 134 |

Coming back to details of management, the value and method of Testing Cows (Vol. I, pp. 146, 233) should be given attention. Probably the most important aim of dairy experts and advisers to-day is the elimination of "robber" and "boarder" cows from the dairy herds. The Babcock Test, a pair of scales, and a few extra minutes spent in the dairy house every day for a month or two are the means whereby the unprofitable individuals can be discovered.

Consideration of Hand *versus* Machine Milking is given in Vol. I, p. 149. A further logical step is to the construction of Dairy Barns (Vol. VII, p. 122), especially with reference to their Ventila-

tion (Vol. II, p. 57). Similarly the disposal of Dairy Sewage (Vol. II, p. 45) is important in maintaining health.

Of course the dairyman must know the general principles of Cattle Diseases, Their Prevention and Cure (Vol. II, pp. 17-44), but he can hardly expect to read systematically the details of all the specific ailments described in Vol. II, pp. 68-474. It will be sufficient if he familiarizes himself with the arrangement of the material so that he can turn to the right place in an emergency. It might be well, however, to become familiar with the symptoms and first-aid treatments of the commoner troubles, such as Bloat (page 83), Milk Fever (page 192), Tuberculosis (page 240), and others.

The other important group of factors in dairying has to do, of course, with the milk itself. These may well be taken up in the following order:

| | |
|--|------------------|
| Milk | Vol. I, p. 192 |
| Buttermilk and Fermented Milks | Vol. I, p. 210 |
| Milk and Its Products as Food | Vol. VII, p. 560 |
| Separators and Separating | Vol. I, p. 227 |
| Butter Making | Vol. I, p. 239 |
| Cheese Making | Vol. I, p. 255 |

Approaching the subject from a rather wider angle, the matter of Certified Milk and Legal Regulations (Vol. I, p. 222) should be studied; while also from a somewhat social standpoint, as well as in the interests of better cattle, Cow Testing Associations (Vol. I, p. 217) are of much importance.

Before closing the volumes the dairyman may care to go a step farther and survey the possibilities of the Milch Goats (Vol. I, p. 415) which, though they have not received very widespread attention, are nevertheless worthy of real consideration.

§ III. THE GENERAL STOCK-RAISER

The efforts of the stock-raiser are aimed at one of two results, or a combination of both. These are (a) the maintenance of a herd or flock, its continual improvement by means of breeding and selection, and the sale of high-class animals for further breeding operations; and (b) the raising and fattening of as many animals as possible, having in mind only their ultimate consumption as meat. The latter industry may involve merely the purchase of young stock as "feeders," or the management of a parent or breeding herd and the care of the beef, pork, or mutton animals throughout the course of their existence; in which case we have an illustration of the combination of the two types above mentioned.

Our farmer may be, therefore, a scientific breeder or simply a feeder, skilled in the art of economically turning crops and feed stuffs into flesh and marketing the latter at a profit. Let no one underestimate the ability needed to succeed in this, for it involves a knowledge of the physiology and, perhaps, even the psychology of the fattening stock, of the composition and effect of feeds, of the condi-

tions and tendencies of local, national, and even world markets. He is not bothered with problems of breeding, with the care of bulls, and milch cows (unless kept to supply food for the others), nor with registration matters. Nor is it essential that he keep his stock continually at such high pressure as is deemed essential by many breeders of pure-breds; for it is with high-class animals as with nations, they must either improve and progress, or inevitably go backward.

Here again, as in the first choice of the type of farming to be followed, the system that is "best" will depend upon the preference, ability, bent, and training of the individual. Any one may prove profitable if pursued wisely, in a favorable environment; or, any system may fail, through lack of ability, judgment, care, or energy, or poor adaptation of the type to existing local conditions.

The matters with which the stock-raiser should familiarize himself by means of books—in this case the *Farmers' Cyclopedia*—are many, for while experience is invaluable, as already remarked, there are principles and theories that explain established practices and which are essential to success.

HORSES AND THEIR CARE

Since horses are somewhat distinct from other farm animals in not representing food value at any stage of their development, at least in America, they may well be considered separately. The first subject of importance to the prospective horse-breeder is the Opportunities Offered by Horse-and-Mule Breeding (Vol. I, p. 78). Following this the Breeds of Horses (page 17) should be studied, also the Market Requirements (page 29) and the Classes (page 34) based upon them. In this systematic study of the horse, Judging and the Score Card (page 89) are entitled to careful attention. Meanwhile it would be well to become thoroughly conversant with the various Terms (page 44) employed in discussing horses and horse-raising.

Coming then to the actual horse management, Breeding (page 22) and Feeding (pages 50, 63) are the most important topics, with the Care of Foals (page 59) an important detail. Here, too, the description of the Mule (page 68) and the discussion of his particular requirements are timely; after which the care of this group, under normal conditions, may be completed with a survey of the subject of Shoeing (page 102). Finally the principles of the care and treatment of the horse in relation to diseases and injuries should be learned (Vol. II, p. 17) and a less detailed study made of the many specific maladies, parasites, and injuries that may be encountered (covering pages 35-410) particularly such frequent troubles as Wounds (page 169), Lameness (pages 208, 212, 236, 239), Azoturia or "Monday-morning sickness" (page 197), and others more or less dangerous or vexatious.

STOCK-FEEDING

Leaving the field of the horse, there are a few subjects that will appeal to the breeder with equal force, no matter what type of

animal he may be interested in. Of these the most extensive is the matter of Feeding. The principles upon, and the methods by, which Rations are Computed (Vol. I, p. 305) are the same, whether for cows or pigs or chickens. Similarly all Commercial Stock Foods (page 319) have some value for all sorts of stock, although each will prove most efficient and economical under certain, specific conditions. Other important miscellaneous feeding matters are found discussed in several of the volumes as follows:

| | |
|---------------------------------------|--------------------|
| The Peanut in Stock-Feeding | Vol. IV, p. 632 |
| Red Clover in Stock-Feeding | Vol. IV, pp. 66-67 |
| Soy Beans in Stock-Feeding | Vol. IV, p. 89 |
| Millet in Stock-Feeding | Vol. IV, p. 114 |
| Cow Peas in Stock-Feeding | Vol. IV, p. 100 |
| Cow Pea Hay | Vol. IV, p. 203 |
| Hay and Pasture Grasses | Vol. IV, p. 117 |
| Fodder Plants | Vol. IV, p. 132 |
| Hay as Stock-Food | Vol. IV, p. 175 |
| Siloing Sugar Beets | Vol. V, p. 639 |
| Beet Pulp | Vol. V, p. 642 |
| Silage | Vol. VII, p. 140 |
| Utilizing Pea Vine Refuse | Vol. VII, p. 49 |

All stock must have shelter as well as food, so the Barn (Vol. VII, p. 117) will be a subject of general interest, as will Fences (Vol. VII, p. 140), and likewise the Silo and its construction (pages 134-140).

Taking up other particular branches of the live stock industry, that of Beef-Raising next is treated in Vol. I. The first material deals, naturally, with the Breeds of beef cattle (page 263) and after this the reader might well learn the Grades of feeding cattle (page 278) that markets and custom have created. Following this the practical discussions of Breeding (page 269) and Feeding (pages 280, 315) for beef follow in order.

It is not infrequently the case that in fattening steers their gain barely pays its cost, and the only actual profit is derived from hogs that follow the cattle in the fattening lots and make their growth on grain that is undigested or would otherwise be wasted. Thus the hog is an extremely important factor in the corn belt as elsewhere, and certainly he has earned the title of "mortgage lifter." The stockman needs therefore to make a careful study of the Breeds of Swine (Vol. I, p. 417) and learn how to Breed (page 425), Feed (page 442), and Care for them (page 497) so as to induce health, the greatest possible contentment, and resulting growth. Of recent years the practice of Pasturing (page 463) has gained much in appreciation as a means for economically producing swine (page 512).

Sheep, too, are a highly profitable feature of general farms everywhere—everywhere, that is, that worthless and uncontrolled dogs, always a curse, have not demoralized the sheep industry. Both wool and mutton Breeds are discussed in Vol. I, p. 355 and those that follow, and the corresponding Market Classification on pages 385-387.

The rather difficult art of judging sheep is carefully explained on page 399, after which the future—or present—shepherd should review the details of Management (pages 344-395), including breeding, feeding, and care under Range Conditions (page 366). The Sheep Barn is given special attention in Vol. VII, p. 121. Finally Goats, the somewhat less aristocratic cousins of the sheep, are discussed in Vol. I, pp. 413-415, with reference to milk and mohair production, and the clearing of brush-covered land, for which purpose they are unexcelled.

The unpleasant but necessary subject of animal Diseases is, as has already been suggested, covered in Vols. II and III. The ailments of the horse have been referred to. Those of cattle cover pages 17 to 472 of Vol. III, and deserve careful study, especially Tuberculosis (page 240), Texas Fever (page 317), Foot and Mouth Disease (special supplement at end of volume) and the others that cause such widespread disaster and loss. The better known Poisonous Plants (Vol. IV, p. 565) are also a distinct cause of loss, especially on the Western ranges. Swine Diseases are treated in Vol. II, beginning with page 410. Tuberculosis (page 477) has caused great loss in the hog industry as well as that of cattle, but the dread Hog Cholera (page 446) has probably done even more harm. Possibly some attacks recognized as the latter have been due to the somewhat similar Swine Plague (page 476); however, the treatment is much the same in both cases. Parasites (page 513) are a further important enemy, especially when, as in the case of *Trichina*, the effects are passed on to human beings. For protection against such contingencies our systems of State and Federal Meat Inspection (page 547) have been developed.

Sheep come in for their share of diseases, discussed in Vol. III, p. 475, together with the maladies that affect goats (page 629), whether of native or foreign origin (Malta Fever is an example of the latter). One last disease that may be said to attack all our domestic animals, but especially the dog, is Rabies, discussed in detail, beginning on page 644.

§ IV. THE POULTRYMAN

The domestic fowl is a creature of paradoxes and of a great variety of possibilities. According to the census of 1910, the value of eggs and fowl produced in 1909 enriched the country by more than 508 millions of dollars; on the other hand, there is probably no more frequent failure than that of the mismanaged or poorly managed poultry business undertaken by an inexperienced novice as insufficiently equipped with capital as with ability and knowledge.

Returning again to the brighter aspect, no branch of farming is more adaptable to different sorts of conditions. The laborer, even the lowliest, with a bit of a back yard little larger than his kitchen, can keep a few hens at almost no cost and have the luxury of a fresh egg as good as the best a millionaire can buy. Or the farm wife may have her flock, perhaps including some ducks and a few turkeys, from which to obtain an occasional, welcome variation for the farm

menu, as well as a substantial bit of pin money. The general farmer can combine his poultry activities with fruit-growing, the disposal of vegetable waste-products and other phases of diversified agriculture. And finally the chicken specialist can develop a "plant" carrying a thousand or more layers, or a high-class show-stock-breeding proposition, serene in the knowledge that similar enterprises are paying every day, and paying well.

Nevertheless, no matter how striking the tales of such success, it must not be forgotten that in poultry-raising, as in all other phases of farm business, success can only follow the application of intelligent, hard work, good judgment, experience, and conscientious study. The first two of these rest with the individual; the latter, or at least its wherewithal, it is the task of the *Farmers' Cyclopædia* to supply. This it does in Vols. I and II, in a total of some 166 pages. The material can well be read in the order in which it is presented, except that the Principles of Keeping Poultry Healthy (Vol. II, p. 595) should be studied in connection with the Rules for Quality Egg Production (Vol. I, p. 624). Similarly it may be as well to read all that is said about the Housing (Vol. I, p. 585), Fattening (page 584), and management of birds in general, and then the discussion of Parasites (Vol. II, p. 554) and Diseases (page 566) before taking up the description of particular breeds, and the specific details of the care of Capons (Vol. I, p. 620), Turkeys (page 596), Ducks (page 603), Geese (page 612), Pigeons (page 612), and even Ostriches (page 619). Finally the field of the mechanical may be surveyed in the subject of Incubation and Incubators (Vol. I, p. 547).

§ V. THE FRUIT-GROWER

There is a charm about fruit-growing that tends largely to equalize the disadvantage of the delay that usually occurs in the realization of profits. It is hard to describe this charm. But whether it is due to the cleanliness of the work, or the attractiveness of the product, the freedom from daily chores, or the variety of tasks that are involved and that offer an opportunity for all ages and sorts of workers, it is responsible for the enthusiastic support of a large and thriving industry.

Since the growing of tree fruits is the work of at least a lifetime, it is essential that the start be made wisely and the preparation be most thorough. This involves the purchase and planting of young trees (unless, of course, the prospective orchardist locates on a farm already established), which subjects deserve careful study. (See Vol. V, p. 62.) Next in importance is probably the general theory of fruit-growing from both home and commercial standpoints, as outlined on the forty-odd pages (beginning page 17) preceding the reference just given. Supplementing this, the special subjects of Pruning (page 72), Irrigation (page 104), the use of Cover Crops (Vol. VII, p. 498), Orchard Protection (page 91), and Harvesting, Storing, and Marketing (pages 128, 138, and Vol. VII, p. 81) should be reviewed.

Thus far the consideration has been solely of the practical side. The well-informed fruit-grower needs, however, to be a horticulturist in a rather more scientific sense. He must know something of the botany and physiology of fruits and Pollination (Vol. V, p. 145) and of the science of propagation in general and Grafting in particular (page 155). He must also be a business man in the broader sense, with a knowledge of how to coöperate and take advantage of the opportunities offered by Fruit-Growers' Associations (page 134), etc.

The next step may be in any of several directions, depending upon the nature and aims of the reader. If he is a student desiring to survey the entire field before following any special line, he might do well to take up Vol. VI and the subject of Fruit Enemies and their destruction. Here he will find Insects Injurious to Fruits (page 29) and Nuts (page 130) and Diseases of Fruits (page 450) discussed under the heads of their different hosts, and the cheering topics of Insecticides (page 362), Fumigation Methods (page 386), and Disease Control (page 656) treated from more general viewpoints as well. Although Bees are included among insects on page 401, they should be classed as beneficial, since they are important agents in the pollination of the blossoms and, thereby, the abundant production of good fruit.

If, however, the reader is more of a specialist who has definite ideas and plans for growing some particular group of fruits, he will probably prefer to leave the general considerations until later, and look into the detailed principles governing whatever variety he is interested in, whether it be Apples (page 174), Pears and Quinces (page 205), Peaches (page 215), Plums and Prunes (page 226), Cherries (page 233), Grapes (page 235), Small Fruits (page 247), Citrus Fruits (page 263), other Tropical or Subtropical Fruits (page 280), or Nuts (page 301). Also it will be of much interest to him to study the classified lists of varieties that have been found especially satisfactory for different sections of the United States (page 171).

§ VI. THE GARDEN LOVER

Owing to the similarity of their interests and of the principles that govern their activities, we are considering, under this one head, the growers of flowers and of vegetables. Of course either one may be an amateur, growing a few flowering plants for love or caring for a tiny plot of vegetables for home use; or he may be a commercial florist or truck gardener dealing with acres of glass, thousands of seedlings, and wagon-loads of produce. In any case, the *Cyclopedia* contains information and assistance that should prove as interesting as it is valuable.

Vegetable Growing is fully and conveniently discussed in the 153 pages in Vol. IV, beginning on page 217. Here each vegetable is dealt with in its alphabetical order, both as a crop for the kitchen garden and, if its nature warrants it, as a market garden or trucking product. Similarly the Insects and Diseases of this group of plants are kept together in the pages following 136 and 531 of

Vol. VI. Such details of spraying and other protective or preventive measures as are not treated there will be found under the general discussions on pages 362 and 656 of the same volume.

Two special subjects that are of interest to the gardener in general and the vegetable grower in particular are Crops to Be Grown in the Orchard (Vol. V, p. 119) and Weeds (Vol. IV, p. 530).

The florist should give his or her attention first to the general discussions of growing Flowers and Ornamental Plants (Vol. V, p. 469, and Vol. VII, p. 73) and then progress to the special subjects of Annuals (Vol. V, p. 480), Commercial Flower-Growing (page 490), the use of Hotbeds (page 500), Coldframes (page 508), and Greenhouses (page 509). The ornamentals come in for their share of troubles, which are described under the headings Insects Affecting Home and Greenhouse Plants (Vol. VI, p. 256), Insects Affecting Dooryard Plants (page 270), Insects Affecting Ornamentals (page 279), and Diseases of Flowers (page 625). For the most part these are well understood, and by following the directions given they can be kept quite in subjection.

§ VII. THE GENERAL FARMER

Having considered the several phases of farming that represent distinct industries, we have left a large group of subjects, none of which justifies a division to itself, but all of which are likely to be of vital importance in a system of general diversified farming. This type, as stated in an earlier chapter, has proved its value and profitability even in such a commonly accepted "one-crop" section as the corn belt. How much more effective must it be where a variety of soils, climatic changes, topographical features, etc., render it necessary to keep at least two crop irons in the fire? Moreover, since increased fertility depends largely upon live stock, and since live stock depend upon generous, careful feeding, the matters that concern the general farmer have a bearing not only upon his success in the fields, but also in the barns and feed lots.

He will want to be thoroughly familiar, for instance, with the nature and uses of the several Grass and Hay Plants (Vol. IV, p. 17), with the Field Crops (page 370), and the Weeds (page 530) that hinder them, as well as those weeds which may be profitably cultivated for use in medicine (page 533). He may find opportunity to grow other of the miscellaneous crops (and if so to fight their enemies), which subjects are discussed under Rice (Vol. IV, p. 600) and Its Diseases (Vol. VI, p. 615), Peanuts (Vol. IV, p. 615), Hops (page 634), Cotton (page 529), Its Diseases (Vol. VI, p. 601), and Its Insect Enemies (page 236), Hemp (Vol. IV, p. 575), Tobacco (page 587), Its Insect Pests (Vol. VI, p. 251), and Diseases (page 620), Sugar Cane (Vol. IV, p. 657), Its Insect Troubles (Vol. VI, p. 227), and Diseases (page 596), Sorghum crops (Vol. IV, p. 647), Their Diseases (Vol. VI, p. 612), Sugar Beets (Vol. IV, p. 620), and Their Diseases (Vol. VI, p. 593), Prickly Pear (Vol. IV, p. 588), Ginseng (page 598), and so on.

So, too, the field crops and grains have their pests, which are grouped as follows:

| | |
|---|-----------------------|
| Insects Injurious to Grains | Vol. VI, p. 168 |
| Insects Injurious to Grasses, Clovers, etc. . . | Vol. VI, p. 197 |
| Insects Injurious to Stored Products . . . | Vol. VI, p. 217 |
| Insects Injurious in the Farm Home . . . | Vol. VI, pp. 328, 351 |
| Insects and Their Remedies | Vol. VI, p. 395 |
| Diseases of Grain and Forage Crops . . . | Vol. VI, p. 576 |
| Diseases of Staple Crops | Vol. VI, p. 593 |
| Diseases that Attack Stored Products . . . | Vol. VI, p. 652 |
| Diseases and Their Control | Vol. VI, p. 656 |

Then there are the details of the management by which Field Crops may be Protected (page 351); and a good list of Beneficial Insects (page 400) which give a slightly brighter lining to the clouds of obstacles in the farmer's way.

The Rotations (Vol. VII, p. 201) in which he can use these crops, the manner in which, and materials with which he shall Fertilize them (page 388) are essential factors in his progress, the use of Green Manures (page 492) being a profitable way to utilize materials that cannot well be harvested nor permitted to go to waste. In this science of plant-feeding and soil-fertilizing there is a complete terminology (page 521) which the farmer should learn before discussing the matter or trying to determine the value of fertilizing materials.

Drainage (Vol. VII, p. 258) is the open door through which many a farmer has reached success and through which many more must yet pass if they are to utilize all of their farms. Incidentally, since they have such a direct influence on the moisture supply in the soil, Forests are important factors at this point, and the general farmer should understand what Forestry (Vol. II, p. 319) means and what it offers whether, in his case, it represents taking care of a standing wood lot and making it yield an annual profit, or setting out a new forest on land too poor, or too wet, or too steep for other utilization. The thorns in this bunch of roses are the Insects (Vol. VI, p. 279) and the Diseases (page 640) that attack forest trees. However, one indisputable advantage exists in the fact that timber destroyed by either of these agencies may still be of use to nearly its normal extent.

The Machinery (Vol. VII, p. 84) with which he does his work should be a subject of much interest to any man, especially when the history of its development involves a tale full of romance and human interest, as in the case of farm implements. It may also create a new appreciation of the men who have conceived and perfected these labor-savers, and appreciation is a desirable sentiment in any vocation, stimulating as it does a spirit of Coöperation (Vol. VII, p. 246). And through coöperation there is likely to come in time the greatest development and progress that has ever taken place in agriculture—the industry upon which rest the welfare and the very existence of Mankind.



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